FIVE-PLACE

LOGARITHMIC AND TRIGONOMETRIC TABLES

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[*Continued on next page*]

[*Continued from preceding page*]

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LOGARITHMIC AND TRIGONOMETRIC TABLES

FIVE PLACES

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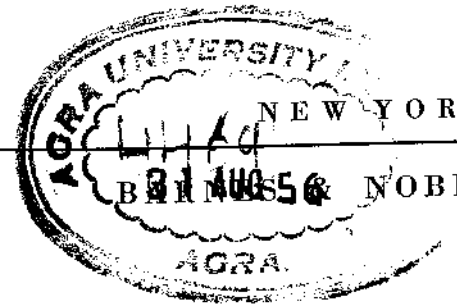

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TABLE OF CONTENTS

EXPLANATION OF TABLES

Introduction.

Before considering each individual table it is necessary to con-
er the fundamental principles of logarithms. *The* **logarithm** *of*
umber **N** *to the base* **a** *is the exponent* **x** *of the power to which*
base must be raised to equal the number **N.** The base **a** must
positive and not equal to **1;** further, to stay within the field of
l numbers, **N** is taken to be positive. The statement *"The logarithm*
N *to the base* **a**" is abbreviated "$\log_a N$." Thus the above defini-
n can be stated symbolically:

$$If\ N = a^x,\ then\ x = \log_a N.$$

e logarithm thus defined is unique; every positive number has
e and only one logarithm, and every logarithm represents one
d only one number.

The following statements, read across the page, are equivalent.

$3^2 = 9$; $\log_3 9 = 2$.
$25^{1/2} = 5$; $\log_{25} 5 = 1/2$.
$2^{-3} = 1/8$; $\log_2 1/8 = -3$.

Properties of Logarithms.

The following four properties are easily proved by using the
ws of exponents.

I. *The logarithm of a product is equal to the sum of the logarithms of its factors;*

$$\log_a MN = \log_a M + \log_a N.$$

II. *The logarithm of a quotient is equal to the logarithm of the numerator minus the logarithm of the denominator;*

$$\log_a \frac{M}{N} = \log_a M - \log_a N.$$

II. *The logarithm of the* k^{th} *power of a number equals* **k** *times the logarithm of the number;*

$$\log_a N^k = k \log_a N.$$

V. *The logarithm of the* q^{th} *root of a number is equal to the number divided by* **q;**

$$\log_a \sqrt[q]{N} = \frac{1}{q} \log_a N.$$

These four properties are used extensively in computation.

Illustration.

Express

$$\log \frac{(\sqrt{59.32})(0.436)}{(3.294)^3(3.1416)}$$

as the algebraic sum of logarithms.

Solution:

$$\log \frac{(\sqrt{59.32})(0.436)}{(3.294)^3(3.1416)}$$

[By II]:

$$= \log(\sqrt{59.32})(0.436) - \log(3.294)^3(3.1416)$$

[By I]:

$$= \log\sqrt{59.32} + \log 0.436 - [\log(3.294)^3 + \log 3.1416]$$

[By III & IV]:

$$= \tfrac{1}{2}\log 59.32 + \log 0.436 - 3\log 3.294 - \log 3.1416.$$

For computational purposes the base a is taken to be 10; the logarithms are then called **common logarithms.** When $a = 10$ the base is usually omitted in the abbreviated symbol; thus the common logarithm $\log_{10} N$ is simply written $\log N$.

From the above definition of a logarithm it is easily seen that the following table gives the numbers whose common logarithms are integers.

Exponential Form	Logarithmic Form
$10^3 = 1000$	$\log 1000 = 3$
$10^2 = 100$	$\log 100 = 2$
$10^1 = 10$	$\log 10 = 1$
$10^0 = 1$	$\log 1 = 0$
$10^{-1} = 0.1$	$\log 0.1 = -1$
$10^{-2} = 0.01$	$\log 0.01 = -2$
$10^{-3} = 0.001$	$\log 0.001 = -3$

By studying this table it is evident that logarithms are, in general, not integers. They are in general an integer plus a proper

ction which is expressed in decimal form. The integral part is led the **characteristic,** and the decimal fraction is called the **mtissa.** Thus

log N = characteristic + mantissa.

general the mantissas are non-repeating infinite decimals which n be approximated correctly to as many places as desired. They e compiled in tabular form and are known as logarithmic tables. *us the mantissa, or decimal part, is found from tables. These lues are* **always positive.**

The characteristic is determined according to the following o rules:

ule 1.

If the number **N** *is greater than* **1,** *the characteristic of its logarithm is one less than the number of digits to the left of the decimal point.*

ule 2.

If the number **N** *is less than* **1,** *the characteristic of its logarithm is* **negative;** *if the first digit which is not zero occurs in the* k^{th} *decimal place, the characteristic is* **minus k.**

Since the complete logarithm is given by

log N = characteristic + mantissa;

nd, further, since the mantissa is always positive, the negative characteristic, — k, should always be written as **(10 — k) — 10.** Thus suppose the mantissa is .57325; then if the characteristics are 1, 0, — 1, and — 2, the logarithms are written 1.57325, 0.57325, 9.57325 — 10, and 8.57325 — 10, respectively.

Illustrations.

The characteristics of the logarithms of the numbers in the left column are given in the right column.

Number	Characteristic
135.2	2
57.35	1
2.693	0
0.3296	9-10
0.0735	8-10
0.000037	5-10

The numbers 0.05903, 0.590300, 5903, 5903000 are said to have the *same sequence* of digits. (The initial and end zeros are disregarded; the significant digits being 5903.) The *mantissa* of the logarithm for each of these numbers is the *same* and is the mantissa for 5903; the characteristics are, of course, different.

Antilogarithms.

If the logarithm is given, the problem becomes that of finding the number which corresponds to this logarithm. The number is called the **antilogarithm.** The characteristic of the given logarithm determines the position of the decimal point in the antilogarithm; the mantissa determines the digits of the number. To place the decimal point in the number, use in reverse order the two rules given previously for determining the characteristic of a number. Thus suppose the digits of the antilogarithm are 37564 and the characteristic is 1. Since the characteristic is positive, Rule 1 is to be used; using Rule 1 it is noted that there should be two digits before the decimal point in the antilogarithm. Thus the decimal point is placed after the "7," making the number 37.564. If the characteristic had been 8 — 10, that is, — 2, then Rule 2 would apply, and the first non-zero digit after the decimal point in the antilogarithm should be in the second place; therefore, the number would be 0.037564.

Cologarithms.

The cologarithm of a number is defined as the logarithm of the reciprocal of the number.

$$\text{colog } N = \log \frac{1}{N} = \log 1 - \log N = 0 - \log N$$
$$= (10.00000 - 10) - \log N.$$

Illustration.

If log 35.7 = 1.55267, find colog 35.7.

Solution:

$$\begin{aligned} \text{colog } 35.7 &= \log 1 - \log 35.7 \\ &= 10.00000 - 10 \\ \text{minus} \quad & \quad 1.55267 \\ &= 8.44733 - 10. \end{aligned}$$

To find a cologarithm mentally:

Subtract each digit of the logarithm of the number, except the last one, from 9 and the last one from 10 and subtract 10 from the result. Thus in the above illustration: $9 - 1 = 8$; $9 - 5 = 4$; $9 - 5 = 4$; $9 - 2 = 7$; $9 - 6 = 3$; $10 - 7 = 3$ giving $8.44733 - 10$.

Cologarithms are used in computation when it appears to be desirable to add all the logarithms instead of subtracting some of them. They are also used to find log sec θ and log csc θ.

A dash printed over a terminal 5 indicates that the true value is less than 5. For example the logarithm of 59903 to seven decimal places is 4.7774486; to five decimal places this is written 4.77745. If only four decimal places are required in a computation, the 5 is neglected. Thus the above logarithm is written 4.7774. When a dash is not printed over a terminal 5, and only four decimal places are required, the fourth decimal figure is increased by one and the 5 neglected. For example, the logarithm of 7671 to five decimal places is 3.88485; to four places this is written 3.8849.

2. Table of the Common Logarithms of Numbers.

Pages 2-3 contain the mantissas of the logarithms of all numbers of one, two, and three digits; the characteristics are determined by the rules previously given. If the number has one or two digits, it is given in the left column, headed N, and the mantissa of its logarithm is directly opposite it in the second column, headed "L 0." Thus, log 3 = 0.47712, log 0.067 = 8.82607 — 10. If the number has three digits, the first two are given in the "N" column and the third digit is given in the horizontal row at the top or bottom of the page. The mantissa of its logarithm is at the intersection of the line containing the first two digits and the column containing the third. Thus, log 184 = 2.26482, log 89.1 = 1.94988, log .937 = 9.97174 — 10.

The logarithm of numbers of one, two, and three digits may also be found by using pp. 4-21. For example, on p. 2 we find log 12 = 1.07918; this logarithm may also be found on page 4 in the "120" row and the "L 0" column. This is true because 12 and 1200 have the same sequence of digits; and therefore, have the same mantissa.

Pages 2-3 are not to be used when finding the antilogarithm.

Pages 4-21 contain the mantissas of the logarithms of all numbers up to four significant digits and may be used to interpolate to five places the logarithms of numbers of five and six significant digits. The arrangement is similar to that of pp. 2-3. The first three digits of the number are given in the *left* column, headed by N, and the fourth in the horizontal row at the top or bottom of the page (these digits head the columns and the columns may be spoken of as the "2" column or "6" column, etc.). The last three figures of the mantissas are given in the columns headed 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, and the first two, at intervals, in the second column under "L." When the first two are not given in any line, they are to be taken from the first line *above* containing them, except when the last three are preceded by a $_*$.

The meaning of the ($_*$) in the table.

If the last three digits of the mantissa are preceded by a $_*$, the first two digits of the mantissa are to be taken from the row *directly below* the one in which the last three appear.

Illustrations.

1. Find log 32.46.

Solution: By Rule 1 the characteristic is 1.

Find the first three digits in the "N" column (p. 8). In the "324" row and the "6" column find 135; these are the **last three** digits of the mantissa; the **first two** are found in the second column under "L"; they are 51. Thus log 32.46 = 1.51135.

2. Find log 0.3807.

Solution: By Rule 2 the characteristic is — 1.

Find 380 in the "N" column (p. 9). In the "380" row and the "7" column read $_*$058. Since this number is preceded by $_*$, the first two digits are to be taken from the row directly below the "380" row; thus opposite 381 under "L" read 58. Therefore, log 0.3807 = 9.58058 — 10.

3. Given log N = 2.89382. Find N.

Solution: The mantissa is 89382. The first two digits appear in the second column under "L." Thus find 89 in this column (p. 17). In columns "0—9" search for the last three digits 382. They are found in the "1" column, opposite 783 in the "N" column. Therefore the digits in the number are 7831. The characteristic is 2; therefore, by Rule 1 there should be three digits before the decimal point. Thus N = 783.1.

Interpolation.

When the number has more than four digits, its logarithm is found by *interpolation*. For small differences, it is assumed that differences between numbers are proportional to the differences between their logarithms. For example, required the logarithm of 224.58. The characteristic is 2. The mantissa is between those for 22450 and 22460, which are 35122 and 35141, respectively. The tabular difference is found by subtracting the two consecutive mantissas. Thus tabular difference = 35141 — 35122 = 19. The difference between the numbers 22450 and 22460 is 10 and 22458 is 8 greater than 22450; hence its mantissa is 8/10 of 19 greater than that of 22450. Thus 8/10 of 19 = 15 to the nearest integer is to be added to 35122 and it is easily seen that log 224.58 = 2.35137.

Table of Proportional Parts.

To facilitate interpolation, the tenths of the tabular differences are given under P P (Proportional Parts) in the extreme right-hand column in the table. In this column the tabular difference heads a group of numbers. In each group the integers 1 to 9 in a column on the *left* represent the *fifth* digit in the number N. The numbers on the *right* represent the corresponding proportional part for that tabular difference. Thus in the above example the tabular difference is 19. In the "P P" column (see p. 6), in the group headed "19," and opposite 8 (the fifth digit in N) read 15.2. This was the amount which was added to the *smaller* mantissa. The decimal point in 15.2 indicates the position of the last digit in the given table; thus the above addition was

$$\begin{array}{r} 35122 \\ 152 \\ \hline 351372 \end{array}$$

and then rounded off to five digits.

Illustration.

Given log N = 7.55469 — 10. Find N.

Solution: The mantissa 55469 is between 55461 and 55473 as found in the table corresponding to N = 3586 and N = 3587, respectively. The tabular difference = 55473 — 55461 = 12. The PP difference = 55469 — 55461 = 8 (**always** subtract the **smaller found** mantissa from the **given** mantissa to find this difference). In the "P P" column in the group headed by 12 find 8.4 on the *right;* this is the closest number to 8. To the left of this number is found the number 7, which is therefore the *fifth* digit of N. The first four are those which correspond to the *smaller* mantissa found in the table, i.e., 3586. Therefore the digits of the number are 35867. The characteristic is 7 — 10 = — 3. Thus N = 0.0035867.

The logarithm of a six digit number may be found by interpolation; this degree of accuracy is, however, seldom required by a five-place table.

Illustration.

Find log 168.342.

Solution: The characteristic is 2.

The mantissa for 1683 is 22608 (p. 5). The tabular difference is 26. In the "P P" column

the proportional part for 4 = 10.4

1/10 proportional part for 2 = .52.

Therefore proportional part for 42 = 10.92,

or 11, to the nearest integer. Thus add 11 to 22608 and log 168.342 = 2.22619.

The above procedure can be used in reverse to find the antilogarithm to six digits.

The S and T tables which appear at the bottom of the pages will be explained later.

Computations Using Logarithms.

In carrying out computations using logarithms it is desirable to have a systematic form in which to display the work. Only a systematic form can be read by a person who has not carried out

he actual computations. The following form, given in the illustra-ions, is recommended.

Illustrations.

1. Find N if $N = \dfrac{(\sqrt[3]{0.9573})\,(3.21)^2}{98.32}$.

Solution: By the four properties of logarithms

$$\log N = \tfrac{1}{3} \log 0.9573 + 2 \log 3.21 - \log 98.32.$$

(1)	$\frac{1}{3}$ log 0.9573 = $\frac{1}{3}$ [9.98105 — 10]	= 9.99368 — 10
(2)	2 log 3.21 = 2 [0.50651]	= 1.01302
(3)	(1) + (2)	= 11.00670 — 10
(4)	log 98.32	= 1.99264
(5)	(3) — (4)	= 9.01406 — 10
	N = 0.10329	

Note: to find

$\frac{1}{3}$ [9.98105 — 10] = $\frac{1}{3}$ [29.98105 — 30] = 9.99368—10

always rearrange a negative characteristic so that *after* dividing the result will be **x.xxxxx — 10.**

2. Find N if $N = \sqrt{\dfrac{(0.35926)^3}{673.52}}$

Solution:

$$\log N = \tfrac{1}{2} [3 \log 0.35926 - \log 673.52].$$

(1)	3 log 0.35926 = 3 [9.55541 — 10]		= 28.66623 — 30
(2)	log 673.52		= 2.82835
(3)	(1) — (2)		= 25.83788 — 30
(4)	½ (3)	15.83788 — 20	= 7.91894 — 10
	N = 0.0082974		

Note: In going from (3) to (4) we made the change 25.83788 — 30 = 15.83788 — 20. This was done so that after dividing by 2 the result would be **x.xxxxx — 10.**

The Natural Logarithms.

As was pointed out on an earlier page the base of a logarithm is not necessarily 10. However, besides 10, there is only one other base which is frequently used in mathematical problems; that base is the number e. If the base of a logarithm is e, the logarithm is called the **natural logarithm.** In the abbreviated symbol the natural logarithm is frequently written "ln N." Common logarithms may be converted into natural logarithms by multiplying them by 2.3025850930. Natural logarithms may be converted into common logarithms by multiplying them by 0.4342944819. In general, to convert from the base "a" to the base "b" use the following regulation.

$$\log_a N = \frac{\log_b N}{\log_b a}$$

Page 22 contains an abbreviated table of natural logarithms; it gives the natural logarithm of whole numbers from 1 to 200. The number is given on the left and the logarithm to the right of it. In tables of the natural logarithms the characteristics are explicitly expressed. For example, ln 21 = 3.04452.

3. Logarithms of the Trigonometric Functions.

The table of the logarithms of the trigonometric functions has been divided into two tables. Pages 23-46 contain the logarithms of the trigonometric functions from 0° to 1° and 89° to 90° for every second, and from 1° to 6° and 84° to 89° for even ten seconds. Pages 47-92 contain the logarithms of the trigonometric functions from minute to minute. The second part of the table, which is the most frequently used table, will be explained first. The angles from 0° to 45° are labelled at the *top* of the pages with the minutes for these angles given in the *left*-hand column, and the headings of the columns are to be taken from the *top* of the pages. The angles from 45° to 90° are labelled at the *bottom* of the pages with the minutes in the *right*-hand column, and the headings of the columns are to be taken from the *bottom* of the page. The interpolation is done by the proportional parts table given under the heading "P P" as was done in the table of common logarithms. The tabular differences are given in the table in the columns headed

y "d" to the right of the column of "L Sin" and "L Cos"; "L Tan" nd "L Cot" have a common difference and the "c d" column be- ween them refers to both. The "P P" column gives the proportional arts differences for each second.

The sines and cosines are always less than 1, and therefore the ogarithms of these trigonometric functions always have a negative haracteristic. Similarly, tan θ for $\theta < 45°$ and cot θ for θ between 5° and 90° are less than 1, and the logarithms of these functions ave a negative characteristic. The first part of the characteristic or the logarithms of these functions is explicitly given in the table; t is, therefore, necessary to subtract 10 from the logarithms of the bove mentioned functions as given in the table. The characteristic or the logarithm of tan θ for θ between 45° and 90° and cot θ for $\theta > 45°$ as given in the table is the exact characteristic, and no subtraction is to be made in this case. No logarithms are given for the secant and cosecant; if these functions occur in any computa- tion, express them by means of the reciprocal identities in terms of sine and cosine and use cologarithms. Thus log csc θ = colog sin θ.

Illustrations.

1. Find log sin 23°43′37″.

Solution: Page 71 of the tables gives 23° at the *top;* there- fore the minutes (43) are found in the *left* column. In the "L Sin" column opposite 43′ read 9.60446. In the "d" column between 43′ and 44′ read 28; this is the tabular difference. In the "P P" column, and in the column headed by 28,

opposite 30 read 14.0,

opposite 7 read 3.3;

therefore the proportional part for 37″ is 17.3, or 17 to the nearest integer. Adding this to 9.60446, the result gives log sin 23°43′37″ = 9.60463 — 10.

2. Find log cos 60°36′43″.

Solution: 60° is found at the *bottom* of p. 77; therefore the *right*-hand minute column is used. Opposite 36 in the minute column and in the column headed by "L.Cos" at the *bottom* of

the page read 9.69100. The "d" column gives the tabular difference as 23. Under "P P" in the "23" column

opposite 40 read 15.3,
opposite 3 read 1.2;

therefore the proportional part difference is 16.5 (17). This amount is to be subtracted from 9.69100 because the cosine is a decreasing function (the cotangent is also a decreasing function, whereas the sine and tangent are increasing functions). Thus

$$\log \cos 60°36'43'' = 9.69083 - 10.$$

3. Given $\log \tan \theta = 9.74627 - 10$. Find θ.

Solution: In the "L Tan" columns the number just smaller than 9.74627 is 9.74613 as found on p. 77 and corresponding to 29°8′. The tabular difference as found in the "c d" column is 30; the proportional parts difference is $9.74627 - 9.74613 = 0.00014$, or simply 14. (Only the last two digits are affected in this difference and the subtraction should be done mentally.)

Under "P P" in the "30" column

opposite 10.0 read at the left 20,
opposite 4.0 read at the left 8;

therefore $\theta = 29°8'28''$.

4. Given $\log \cot \theta = 9.81672 - 10$. Find θ.

Solution: In the "L Cot" column search for the numbers close to 9.81672. On p. 81 in the "L Cot" column headed at the bottom of the page find 9.81693 and 9.81666 corresponding to 56°44′ and 56°45′, respectively. The tabular difference, as found in the "c d" column, is 27. The difference between 9.81693 (always use the logarithm corresponding to the *smaller* angle) and 9.81672 (the *given* logarithm) is 21. In the "P P" column under 27

opposite 18.0 (on the right) read 40 (on the left),
opposite 3.2 (on the right) read 7 (on the left);

therefore the proportional part is 47″ and $\theta = 56°44'47''$.

Note: If it is desirable to find the angle to the nearest tenth

of a second it could be accomplished by the proportional parts as follows:

18.0 is the prop. part for 40
2.7 is the prop. part for 6
.32 is the prop. part for .7
thus 21.02 is the prop. part for 46.7

and $\theta = 56°44'46.7''$.

The Small Angles

Pages 23-46 contain the logarithms of the trigonometric functions for the small angles to the seconds. The general arrangement of this table is similar to that just described. Again the degrees are given at the tops and bottoms of the pages. The trigonometric functions are also labelled at the tops and the bottoms of the pages. On pp. 23-25, the minutes and each ten seconds are given in columns at the left and right, headed ′ and ″, and the odd seconds are given in a horizontal row at the top and bottom of each page. On pp. 36-46, the minutes are given in columns at the left and right, headed ′, and each ten seconds is given in a horizontal row at the top and bottom of each page. The columns of minutes on the left read downward; the horizontal rows at the top, from left to right; these go with the degrees at the top of the pages. The columns of minutes at the right and the horizontal rows at the bottom, read in the opposite directions, go with the degrees at the bottoms of the pages. On pp. 36-46 the odd seconds are found by the use of the "P P" columns. On pp. 24-25, the proportional parts are given at the top of the pages; on all other pages they occur in the usual right-hand column.

Illustrations.

1. Find log sin $0°37'24.37''$.

Solution: Page 30 gives log sin $0°37'24'' = 8.03659 - 10$. Tabular difference is 19. "P P" columns reads

proportional part for $3 = 5.7$,
$1/10$ proportional part for $7 = 1.33$;
therefore proportional part for $.37 = 7.03$ or 7.

Thus log sin $0°37'24.37'' = 8.03666 - 10$.

2. Find log tan 0°42′17.48″.

Solution: From p. 33: log tan 0°42′17″ = 8.08992 — 10. Tabular difference is 17 and from the "P P" column the proportional part for .48 is 8.16 or 8.
Thus log tan 0°42′17.48″ = 8.09000 — 10.

3. Find log cos 89°43′26.4″.

Solution: From p. 26: log cos 89°43′26″ = 7.68296 — 10. The tabular difference is 44 and the "P P" column gives the proportional part for 4 as 17.6 or 18. Since the cosine is a decreasing function this is to be subtracted from the above logarithm. Therefore the result is log cos 89°43′26.4″ = 7.68278 — 10.

4. Find log cot 84°34′32″.

Solution: From p. 45: log cot 84°34′30″ = 8.97758 — 10. The tabular difference is 23 and the "P P" column gives the proportional part for 2 as 4.6 or 5. Subtract this from the above logarithm and obtain the result, log cot 84°34′32″ = 8.97753 — 10.

5. Given log tan θ = 8.74875 — 10. Find θ.

Solution: From p. 41: log tan 3°12′30″ = 8.74861 — 10. The tabular difference is 38 and the prop. parts difference (8.74875 — 8.74861) is 14. From the "P P" column under 38 the proportional part for 3.7 is 14.6. Thus θ = 3°12′33.7″.

S and T Tables.

When a very small angle is to be found by means of its logarithmic sine or tangent (angle near 90° by means of its logarithmic cosine or cotangent), and accuracy is desired, the cologarithm of S or T, pp. 2-21, should be used. These are given in the columns headed "C S" and "C T," pp. 48-50. When the logarithm of the sine or tangent of very small angles (cosine or cotangent of angles near 90°) expressed to many decimal fractions of a second, the S and T table should be used. The formulas for their use are as follows:

To find the logarithm:

$\log \sin \theta = \log \theta'' + S;$
$\log \tan \theta = \log \theta'' + T;$
$\log \cos \theta = \log (90° - \theta)'' + S;$
$\log \cot \theta = \log (90° - \theta)'' + T;$
where θ'' = number of seconds in θ and $(90° - \theta)''$ = number of seconds in $90° - \theta$.

To find the angle:

$\log \theta'' = \log \sin \theta + CS;$
$\log \theta'' = \log \tan \theta + CT;$
$\log (90° - \theta)'' = \log \cos \theta + CS;$
$\log (90° - \theta)'' = \log \cot \theta + CT;$
where the notation is the same as above.

Illustrations.

1. Find log sin 3.4785″.

Solution.

From p. 8: $\log 3.4785 = 0.54139$
From p. 2: $S = 4.68557 - 10$
$\log \sin 3.4785'' = 5.22696 - 10.$

2. Given $\log \sin \theta = 6.82973 - 10$. Find θ.

Solution: The value of θ (see p. 58) lies between 0°2′ and 0°3′, or between 120″ and 180″, and, corresponding to this,

$CS = 5.31443$
$\log \sin \theta = 6.82973 - 10$
$\log \theta'' = 2.14416.$

The number corresponding to the logarithm 2.14416 is (p. 4) 139.368. Therefore, $\theta = 139.368'' = 0°2'19.368''$.

Change of Trigonometric Functions.

It is sometimes required to find the logarithm of one trigonometric function from that of another, without requiring the angle. To facilitate this, special proportional tables, headed with the tabular differences of both functions, are given (pp. 57-92) wherever the space admits it.

Illustration.

Given, log tan x = 9.67644. Find log cos x.

Solution: The difference between the given logarithm and that given in the table, 9.67622 — 10 (see p. 73, opposite 25°23′), is 22. The tabular differences of the two logarithmic functions at this place are 32 and 6. In the proportional parts table for 6/32, 22 corresponds to 4; this, subtracted from the tabular logarithmic cosine 9.95591 — 10, gives the required

log cos x = 9.95587 — 10.

Angles Greater than 90 Degrees.

In the examples already given, the angles have all been less than 90°. The logarithms of trigonometric functions of angles greater than 90° may be obtained by the following theorem.

Any function of an angle θ is numerically equal to the same function of the reference angle for θ; i.e.,

(any function of θ) = ± (same function of α),

where

$\alpha = 180° - \theta$, *if* θ *is between* 90° *and* 180°,

$\alpha = \theta - 180°$, *if* θ *is between* 180° *and* 270°,

$\alpha = 360° - \theta$, *if* θ *is between* 270° *and* 360°.

The "+" or "—" is determined by the following table:

If θ is between 90° and 180°, the sine and cosecant are positive and all others, negative.

If θ is between 180° and 270°, the tangent and cotangent are positive and all others, negative.

If θ is between 270° and 360°, the cosine and secant are positive and all others, negative.

If θ *is greater than* 360°,

any function of θ = same function of (θ — n 360°),

where n *is an integer.*

Illustration.

1. Find log sin 112°15′17″.

Solution:

log sin 112°15′17″ = log sin 67°44′43″ = 9.96638 — 10.

2. Find log cos 202°28′34″.

Solution:
log cos 202°28′34″ = log cos 22°28′34″ = 9.96569 — 10 (n). Since the cosine is negative for any angle between 180° and 270°, (n) is placed after the logarithm to indicate that the trigonometric function is negative. This is the usual way of indicating that the number corresponding to a logarithm is negative.

4. Natural Trigonometric Functions.

Pages 94-116 contain the natural trigonometric functions for each minute. The arrangement is the same as that of the logarithms of the trigonometric functions, except that differences and proportional parts are not given. To interpolate for these functions, the method of linear interpolation is used.

Illustrations.

1. Find tan 59°27.3′.

Solution: From the table tan 59°27′ = 1.6943 and tan 59°28′ = 1.6954. The tabular difference is 0.0011; multiplying this tabular difference by .3 the result is 0.00033. This amount is to be added to the value for tan 59°27′. Thus tan 59°27.3′ = 1.6946.
The computation can be written as follows:

$$\left.\begin{array}{l}\tan\ 59°27' = 1.6943\\ \tan\ 59°27.3' = 1.6946\\ \tan\ 59°28' = 1.6954\end{array}\right] (0.0011)(.3) = 0.00033.$$

2. Find cos 76°58′36″.

Solution:

$$\text{From table: } \left.\begin{array}{ll}\cos\ 76°58' & = 0.2255\\ \cos\ 76°58'36'' & = 0.2253\\ \cos\ 76°59' & = 0.2252\end{array}\right] (-.0003)\left(\frac{36}{60}\right) = -.00018.$$

Thus cos 76°58′36″ = 0.2253.

5. Haversines.

Used in navigation and in the solution of ordinary oblique triangles, these tables give the values and the logarithms of haver-

sines of angles from 0° to 180° at 10′ intervals. The characteristics of the logarithms have been omitted; these are to be determined from the value of the haversine according to the two rules for the characteristic of a logarithm. Interpolation to the nearest minute may be made by linear interpolation as in the case of the natural trigonometric functions.

Definition.

The definition of the haversine is

$$\text{hav } \theta = \frac{1 - \cos \theta}{2}$$

The Haversine Law.

In any spherical triangle

$$\text{hav } a = \text{hav}(b - c) + \sin b \cdot \sin c \cdot \text{hav } A,$$
$$\text{hav } b = \text{hav}(a - c) + \sin a \cdot \sin c \cdot \text{hav } B,$$
$$\text{hav } c = \text{hav}(a - b) + \sin a \cdot \sin b \cdot \text{hav } C.$$

5. The Right Triangle.

In solving problems which deal with triangles it is convenient to have the necessary formulas listed in one place. The formulas related to the right triangle are listed in this section; and those for the oblique triangle will be given in the next section. For the lettering see Fig. 1.

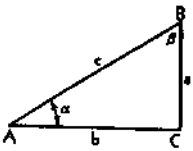

Fig. 1.

(1) $\sin \alpha = \frac{a}{c} = \cos \beta.$ (2) $\cos \alpha = \frac{b}{c} = \sin \beta.$

(3) $\tan \alpha = \frac{a}{b} = \cot \beta.$ (4) $\cot \alpha = \frac{b}{a} = \tan \beta.$

(5) $a^2 + b^2 = c^2.$ (6) $\alpha + \beta = 90°.$

For logarithmic computation (5) is written in the forms

(7) $a = \sqrt{(c - b)\,c + b)};$ (8) $b = \sqrt{(c - a)\,(c + b)}.$

The computation should always be displayed in a systematic form. The form given in the illustration is recommended and it is further suggested that the form be written down before turning to the tables and finding the logarithms.

Illustration.

Solve the right triangle ABC if $\beta = 37°23'43''$ and $a = 1.3572$.

Solution:

Data: $a = 1.3572$; $\beta = 37°23'43''$.

Formulas	Computation	
$\alpha = 90° - \beta$	$\alpha = 90° - 37°23'43'' =$	$52°36'17''$
$\frac{b}{a} = \tan\beta$, or $b = a \tan\beta$.	$\log a = 0.13264$ $\log \tan\beta = 9.88334 - 10$ $\log b = 0.01598$	$b = 1.0375$
$\frac{a}{c} = \cos\beta$, or $c = \frac{a}{\cos\beta}$	$\log a = 10.13264 - 10$ $\log \cos\beta = 9.90008 - 10$ $\log c = 0.23256$	$c = 1.7083$
check: $a = \sqrt{(c-b)(c+b)}$ $c - b = 0.6708$ $c + b = 2.7458$ $\log a = 0.13264$	check	$\log (c-b) = 9.82659 - 10$ $\log (c+b) = 0.43867$ sum $= 0.26526$ $\frac{1}{2}$ sum $= 0.13263$

7. Oblique Triangles.

The formulas for an oblique triangle are as follows; for the lettering see Fig. 2.

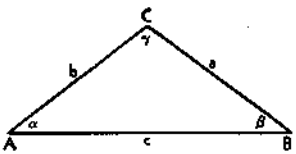

Fig. 2

(1) *Sum of the Angles:*

$$\alpha + \beta + \gamma = 180°.$$

(2) *The Law of Cosines:*

$$a^2 = b^2 + c^2 - 2bc \cos \alpha;$$
$$b^2 = a^2 + c^2 - 2ac \cos \beta;$$
$$c^2 = a^2 + b^2 - 2ab \cos \gamma.$$

Solving for the angles, these formulas read

$$\cos \alpha = \frac{b^2 + c^2 - a^2}{2bc};$$
$$\cos \beta = \frac{a^2 + c^2 - b^2}{2ac};$$
$$\cos \gamma = \frac{a^2 + b^2 - c^2}{2ab}.$$

(3) *The Law of Sines:*

$$\frac{a}{\sin \alpha} = \frac{b}{\sin \beta} = \frac{c}{\sin \gamma}.$$

(4) *The Law of Tangents:*

$$\frac{a - b}{a + b} = \frac{\tan \frac{1}{2}(\alpha - \beta)}{\tan \frac{1}{2}(\alpha + \beta)};$$
$$\frac{a - c}{a + c} = \frac{\tan \frac{1}{2}(\alpha - \gamma)}{\tan \frac{1}{2}(\alpha + \gamma)};$$
$$\frac{b - c}{b + c} = \frac{\tan \frac{1}{2}(\beta - \gamma)}{\tan \frac{1}{2}(\beta + \gamma)}.$$

(5) *Half-Angle Formulas:*

$$\tan \frac{\alpha}{2} = \frac{r}{s - a}; \qquad \tan \frac{\beta}{2} = \frac{r}{s - b};$$
$$\tan \frac{\gamma}{2} = \frac{r}{s - c};$$

where

$$s = \tfrac{1}{2}(a + b + c)$$

and

$$r = \sqrt{\frac{(s - a)(s - b)(s - c)}{s}}.$$

(6) *The Area of the Oblique Triangle:*

I. $K = \frac{1}{2}bc \sin \alpha$; $K = \frac{1}{2}ac \sin \beta$; $K = \frac{1}{2}ab \sin \gamma$.

II. $K = \sqrt{s(s - a)(s - b)(s - c)}$.

III. $K = \dfrac{a^2 \sin \beta \sin \gamma}{2 \sin \alpha}$; $K = \dfrac{b^2 \sin \alpha \sin \gamma}{2 \sin \beta}$;

$$K = \frac{c^2 \sin \alpha \sin \beta}{2 \sin \gamma}$$

7) *Solution of the Cases.*

Problems of oblique triangles are divided into four cases which may be solved by the above formulas according to the following summary.

Cases	Solution
I. Given two angles and a side.	Solve by the law of sines. Find the area by III.
II. Given two sides and an opposite angle.	Ambiguous case. Solve by the law of sines.
II. Given two sides and the included angle.	Find the angles by law of tangents; then find the third side by the law of sines. If only third side is required, use the law of cosines. Find the area by I.
V. Given three sides.	Solve by half angle formulas. Law of cosines may be used. Find the area by II.

Illustrations.

Solve the triangle ABC, if $\alpha = 39°28'14''$, $\gamma = 110°43'17''$, $a = 36.483$.

Solution:

Data: $\alpha = 39°28'14''$; $\gamma = 110°43'17''$; $a = 36.483$.

Formulas	Computation	
$\beta = 180° - (\alpha + \gamma)$	$\beta = 180° - (150°11'31'') =$	$29°48'29''$
$\frac{b}{\sin \beta} = \frac{a}{\sin \alpha}$ $b = \frac{a \sin \beta}{\sin \alpha}$	$\log a = 1.56209$ $\log \sin \beta = 9.69644 - 10$ sum $= 11.25853 - 10$ $\log \sin \alpha = 9.80324 - 10$ $\log b = 1.45529$	$b = 28.529$
$\frac{c}{\sin \gamma} = \frac{a}{\sin \alpha}$ $c = \frac{a \sin \gamma}{\sin \alpha}$	$\log a = 1.56209$ $\log \sin \gamma = 9.97096 - 10$ sum $= 11.53305 - 10$ $\log \sin \alpha = 9.80324 - 10$ $\log c = 1.72981$	$c = 53.680$

8. Trigonometric Identities.

I. The Fundamental Identities.

$$\csc\theta = \frac{1}{\sin\theta}; \quad \sec\theta = \frac{1}{\cos\theta}; \quad \tan\theta = \frac{1}{\cot\theta}$$

$$\tan\theta = \frac{\sin\theta}{\cos\theta}; \quad \cot\theta = \frac{\cos\theta}{\sin\theta};$$

$$\sin^2\theta + \cos^2\theta = 1;$$

$$\tan^2\theta + 1 = \sec^2\theta;$$

$$\cot^2\theta + 1 = \csc^2\theta.$$

II. Complementary Angles.

$$\sin\theta = \cos(90^\circ - \theta); \quad \cos\theta = \sin(90^\circ - \theta);$$

$$\tan\theta = \cot(90^\circ - \theta); \quad \cot\theta = \tan(90^\circ - \theta);$$

$$\sec\theta = \csc(90^\circ - \theta); \quad \csc\theta = \sec(90^\circ - \theta).$$

III. Negative Angles.

$$\sin(-\theta) = -\sin\theta; \quad \cot(-\theta) = -\cot\theta;$$

$$\cos(-\theta) = \cos\theta; \quad \sec(-\theta) = \sec\theta;$$

$$\tan(-\theta) = -\tan\theta; \quad \csc(-\theta) = -\csc\theta.$$

IV. Multiple Angles.

$$\sin(\alpha + \beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta;$$

$$\cos(\alpha + \beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta;$$

$$\tan(\alpha + \beta) = \frac{\tan\alpha + \tan\beta}{1 - \tan\alpha\tan\beta};$$

$$\sin 2\alpha = 2\sin\alpha\cos\alpha;$$

$$\cos 2\alpha = \cos^2\alpha - \sin^2\alpha;$$

$$\tan 2\alpha = \frac{2\tan\alpha}{1 - \tan^2\alpha};$$

$$\sin \tfrac{1}{2}\alpha = \pm\sqrt{\frac{1 - \cos\alpha}{2}};$$

$$\cos \tfrac{1}{2}\alpha = \pm\sqrt{\frac{1 + \cos\alpha}{2}};$$

$$\tan \tfrac{1}{2}\alpha = \frac{\sin\alpha}{1 + \cos\alpha};$$

$$\sin x + \sin y = 2\sin\frac{x + y}{2}\cos\frac{x - y}{2};$$

$$\sin x - \sin y = 2\cos\frac{x + y}{2}\sin\frac{x - y}{2};$$

$$\cos x + \cos y = 2\cos\frac{x + y}{2}\cos\frac{x - y}{2};$$

$$\cos x - \cos y = -2\sin\frac{x + y}{2}\sin\frac{x - y}{2}.$$

THE GREEK ALPHABET

A	α	alpha	N	ν	nu
B	β	beta	Ξ	ξ	xi
Γ	γ	gamma	O	o	omicron
Δ	δ	delta	Π	π	pi
E	ϵ	epsilon	P	ρ	rho
Z	ζ	zeta	Σ	σ	sigma
H	η	eta	T	τ	tau
Θ	θ	theta	Υ	υ	upsilon
I	ι	iota	Φ	ϕ	phi
K	κ	kappa	X	χ	chi
Λ	λ	lambda	Ψ	ψ	psi
M	μ	mu	Ω	ω	omega

LOGARITHMIC
AND OTHER
TRIGONOMETRIC TABLES

TABLE OF THE COMMON

LOGARITHMS OF NUMBERS

WITH THE AUXILIARIES S AND T.

N	L 0	1	2	3	4	5	6	7	8	9
0	— ∞	00 000	30 103	47 712	60 206	69 897	77 815	84 510	90 309	95 424
1	00 000	04 139	07 918	11 394	14 613	17 609	20 412	23 045	25 527	27 875
2	30 103	32 222	34 242	36 173	38 021	39 794	41 497	43 136	44 716	46 240
3	47 712	49 136	50 515	51 851	53 148	54 407	55 630	56 820	57 978	59 106
4	60 206	61 278	62 325	63 347	64 345	65 321	66 276	67 210	68 124	69 020
5	69 897	70 757	71 600	72 428	73 239	74 036	74 819	75 587	76 343	77 085
6	77 815	78 533	79 239	79 934	80 618	81 291	81 954	82 607	83 251	83 885
7	84 510	85 126	85 733	86 332	86 923	87 506	88 081	88 649	89 209	89 763
8	90 309	90 849	91 381	91 908	92 428	92 942	93 450	93 952	94 448	94 939
9	95 424	95 904	96 379	96 848	97 313	97 772	98 227	98 677	99 123	99 564
10	00 000	00 432	00 860	01 284	01 703	02 119	02 531	02 938	03 342	03 743
11	04 139	04 532	04 922	05 308	05 690	06 070	06 446	06 819	07 188	07 555
12	07 918	08 279	08 636	08 991	09 342	09 691	10 037	10 380	10 721	11 059
13	11 394	11 727	12 057	12 385	12 710	13 033	13 354	13 672	13 988	14 301
14	14 613	14 922	15 229	15 534	15 836	16 137	16 435	16 732	17 026	17 319
15	17 609	17 898	18 184	18 469	18 752	19 033	19 312	19 590	19 866	20 140
16	20 412	20 683	20 952	21 219	21 484	21 748	22 011	22 272	22 531	22 789
17	23 045	23 300	23 553	23 805	24 055	24 304	24 551	24 797	25 042	25 286
18	25 527	25 768	26 007	26 245	26 482	26 717	26 951	27 184	27 416	27 646
19	27 875	28 103	28 330	28 556	28 780	29 003	29 226	29 447	29 667	29 885
20	30 103	30 320	30 535	30 750	30 963	31 175	31 387	31 597	31 806	32 015
21	32 222	32 428	32 634	32 838	33 041	33 244	33 445	33 646	33 846	34 044
22	34 242	34 439	34 635	34 830	35 025	35 218	35 411	35 603	35 793	35 98
23	36 173	36 361	36 549	36 736	36 922	37 107	37 291	37 475	37 658	37 84
24	38 021	38 202	38 382	38 561	38 739	38 917	39 094	39 270	39 445	39 62
25	39 794	39 967	40 140	40 312	40 483	40 654	40 824	40 993	41 162	41 33
26	41 497	41 664	41 830	41 996	42 160	42 325	42 488	42 651	42 813	42 97
27	43 136	43 297	43 457	43 616	43 775	43 933	44 091	44 248	44 404	44 56
28	44 716	44 871	45 025	45 179	45 332	45 484	45 637	45 788	45 939	46 09
29	46 240	46 389	46 538	46 687	46 835	46 982	47 129	47 276	47 422	47 56
30	47 712	47 857	48 001	48 144	48 287	48 430	48 572	48 714	48 855	48 99
31	49 136	49 276	49 415	49 554	49 693	49 831	49 969	50 106	50 243	50 37
32	50 515	50 651	50 786	50 920	51 055	51 188	51 322	51 455	51 587	51 7
33	51 851	51 983	52 114	52 244	52 375	52 504	52 634	52 763	52 892	53 0
34	53 148	53 275	53 403	53 529	53 656	53 782	53 908	54 033	54 158	54 2
35	54 407	54 531	54 654	54 777	54 900	55 023	55 145	55 267	55 388	55 5
36	55 630	55 751	55 871	55 991	56 110	56 229	56 348	56 467	56 585	56 7
37	56 820	56 937	57 054	57 171	57 287	57 403	57 519	57 634	57 749	57 8
38	57 978	58 092	58 206	58 320	58 433	58 546	58 659	58 771	58 883	58 9
39	59 106	59 218	59 329	59 439	59 550	59 660	59 770	59 879	59 988	60 0
40	60 206	60 314	60 423	60 531	60 638	60 746	60 853	60 959	61 066	61 1
41	61 278	61 384	61 490	61 595	61 700	61 805	61 909	62 014	62 118	62 2
42	62 325	62 428	62 531	62 634	62 737	62 839	62 941	63 043	63 144	63 2
43	63 347	63 448	63 548	63 649	63 749	63 849	63 949	64 048	64 147	64 2
44	64 345	64 444	64 542	64 640	64 738	64 836	64 933	65 031	65 128	65 2
45	65 321	65 418	65 514	65 610	65 706	65 801	65 896	65 992	66 087	66 1
46	66 276	66 370	66 464	66 558	66 652	66 745	66 839	66 932	67 025	67 1
47	67 210	67 302	67 394	67 486	67 578	67 669	67 761	67 852	67 943	68 0
48	68 124	68 215	68 305	68 395	68 485	68 574	68 664	68 753	68 842	68 9
49	69 020	69 108	69 197	69 285	69 373	69 461	69 548	69 636	69 723	69 8
50	69 897	69 984	70 070	70 157	70 243	70 329	70 415	70 501	70 586	70 67

N	L 0	1	2	3	4	5	6	7	8	9

60″	= 0″ 1′	S	4.68 557	T	4.68 557	300″	= 0″ 5′	S	4.68 557	T	4.68 55
120	= 0 2		4.68 557		4.68 557	360	= 0 6		4.68 557		4.68 55
180	= 0 3		4.68 557		4.68 557	420	= 0 7		4.68 557		4.68 55
240	= 0 4		4.68 557		4.68 558	480	= 0 8		4.68 557		4.68 55

N	L 0	1	2	3	4	5	6	7	8	9
50	69 897	69 984	70 070	70 157	70 243	70 329	70 415	70 501	70 586	70 672
51	70 757	70 842	70 927	71 012	71 096	71 181	71 265	71 349	71 433	71 517
52	71 600	71 684	71 767	71 850	71 933	72 016	72 099	72 181	72 263	72 346
53	72 428	72 509	72 591	72 673	72 754	72 835	72 916	72 997	73 078	73 159
54	73 239	73 320	73 400	73 480	73 560	73 640	73 719	73 799	73 878	73 957
55	74 036	74 115	74 194	74 273	74 351	74 429	74 507	74 586	74 663	74 741
56	74 819	74 896	74 974	75 051	75 128	75 205	75 282	75 358	75 435	75 511
57	75 587	75 664	75 740	75 815	75 891	75 967	76 042	76 118	76 193	76 268
58	76 343	76 418	76 492	76 567	76 641	76 716	76 790	76 864	76 938	77 012
59	77 085	77 159	77 232	77 305	77 379	77 452	77 525	77 597	77 670	77 743
60	77 815	77 887	77 960	78 032	78 104	78 176	78 247	78 319	78 390	78 462
61	78 533	78 604	78 675	78 746	78 817	78 888	78 958	79 029	79 099	79 169
62	79 239	79 309	79 379	79 449	79 518	79 588	79 657	79 727	79 796	79 865
63	79 934	80 003	80 072	80 140	80 209	80 277	80 346	80 414	80 482	80 550
64	80 618	80 686	80 754	80 821	80 889	80 956	81 023	81 090	81 158	81 224
65	81 291	81 358	81 425	81 491	81 558	81 624	81 690	81 757	81 823	81 889
66	81 954	82 020	82 086	82 151	82 217	82 282	82 347	82 413	82 478	82 543
67	82 607	82 672	82 737	82 802	82 866	82 930	82 995	83 059	83 123	83 187
68	83 251	83 315	83 378	83 442	83 506	83 569	83 632	83 696	83 759	83 822
69	83 885	83 948	84 011	84 073	84 136	84 198	84 261	84 323	84 386	84 448
70	84 510	84 572	84 634	84 696	84 757	84 819	84 880	84 942	85 003	85 065
71	85 126	85 187	85 248	85 309	85 370	85 431	85 491	85 552	85 612	85 673
72	85 733	85 794	85 854	85 914	85 974	86 034	86 094	86 153	86 213	86 273
73	86 332	86 392	86 451	86 510	86 570	86 629	86 688	86 747	86 806	86 864
74	86 923	86 982	87 040	87 099	87 157	87 216	87 274	87 332	87 390	87 448
75	87 506	87 564	87 622	87 679	87 737	87 795	87 852	87 910	87 967	88 024
76	88 081	88 138	88 195	88 252	88 309	88 366	88 423	88 480	88 536	88 593
77	88 649	88 705	88 762	88 818	88 874	88 930	88 986	89 042	89 098	89 154
78	89 209	89 265	89 321	89 376	89 432	89 487	89 542	89 597	89 653	89 708
79	89 763	89 818	89 873	89 927	89 982	90 037	90 091	90 146	90 200	90 255
80	90 309	90 363	90 417	90 472	90 526	90 580	90 634	90 687	90 741	90 795
81	90 849	90 902	90 956	91 009	91 062	91 116	91 169	91 222	91 275	91 328
82	91 381	91 434	91 487	91 540	91 593	91 645	91 698	91 751	91 803	91 855
83	91 908	91 960	92 012	92 065	92 117	92 169	92 221	92 273	92 324	92 376
84	92 428	92 480	92 531	92 583	92 634	92 686	92 737	92 788	92 840	92 891
85	92 942	92 993	93 044	93 095	93 146	93 197	93 247	93 298	93 349	93 399
86	93 450	93 500	93 551	93 601	93 651	93 702	93 752	93 802	93 852	93 902
87	93 952	94 002	94 052	94 101	94 151	94 201	94 250	94 300	94 349	94 399
88	94 448	94 498	94 547	94 596	94 645	94 693	94 743	94 792	94 841	94 890
89	94 939	94 988	95 036	95 085	95 134	95 182	95 231	95 279	95 328	95 376
90	95 424	95 472	95 521	95 569	95 617	95 665	95 713	95 761	95 809	95 856
91	95 904	95 952	95 999	96 047	96 095	96 142	96 190	96 237	96 284	96 332
92	96 379	96 426	96 473	96 520	96 567	96 614	96 661	96 708	96 755	96 802
93	96 848	96 895	96 942	96 988	97 035	97 081	97 128	97 174	97 220	97 267
94	97 313	97 359	97 405	97 451	97 497	97 543	97 589	97 635	97 681	97 727
95	97 772	97 818	97 864	97 909	97 955	98 000	98 046	98 091	98 137	98 182
96	98 227	98 272	98 318	98 363	98 408	98 453	98 498	98 543	98 588	98 632
97	98 677	98 722	98 767	98 811	98 856	98 900	98 945	98 989	99 034	99 078
98	99 123	99 167	99 211	99 255	99 300	99 344	99 388	99 432	99 476	99 520
99	99 564	99 607	99 651	99 695	99 739	99 782	99 826	99 870	99 913	99 957
100	00 000	00 043	00 087	00 130	00 173	00 217	00 260	00 303	00 346	00 389

N	L 0	1	2	3	4	5	6	7	8	9

540″	= 0° 9′	S	4.68 557	T	4.68 558	780″	= 0° 13′	S	4.68 557	T	4.68 558
600	= 0 10		4.68 557		4.68 558	840	= 0 14		4.68 557		4.68 558
660	= 0 11		4.68 557		4.68 558	900	= 0 15		4.68 557		4.68 558
720	= 0 12		4.68 557		4.68 558	960	= 0 16		4.68 557		4.68 558

N	L 0	1	2	3	4	5	6	7	8	9
100	00 000	043	087	130	173	217	260	303	346	389
101	432	475	518	561	604	647	689	732	775	817
102	860	903	945	988	*030	*072	*115	*157	*199	*242
103	01 284	326	368	410	452	494	536	578	620	662
104	703	745	787	828	870	912	953	995	*036	*078
105	02 119	160	202	243	284	325	366	407	449	490
106	531	572	612	653	694	735	776	816	857	898
107	938	979	*019	*060	*100	*141	*181	*222	*262	*302
108	03 342	383	423	463	503	543	583	623	663	703
109	743	782	822	862	902	941	981	*021	*060	*100
110	04 139	179	218	258	297	336	376	415	454	493
111	532	571	610	650	689	727	766	805	844	883
112	922	961	999	*038	*077	*115	*154	*192	*231	*269
113	05 308	346	385	423	461	500	538	576	614	652
114	690	729	767	805	843	881	918	956	994	*032
115	06 070	108	145	183	221	258	296	333	371	408
116	446	483	521	558	595	633	670	707	744	781
117	819	856	893	930	967	*004	*041	*078	*115	*151
118	07 188	225	262	298	335	372	408	445	482	518
119	555	591	628	664	700	737	773	809	846	882
120	918	954	990	*027	*063	*099	*135	*171	*207	*243
121	08 279	314	350	386	422	458	493	529	565	600
122	636	672	707	743	778	814	849	884	920	955
123	991	*026	*061	*096	*132	*167	*202	*237	*272	*307
124	09 342	377	412	447	482	517	552	587	621	656
125	691	726	760	795	830	864	899	934	968	*003
126	10 037	072	106	140	175	209	243	278	312	346
127	380	415	449	483	517	551	585	619	653	687
128	721	755	789	823	857	890	924	958	992	*025
129	11 059	093	126	160	193	227	261	294	327	361
130	394	428	461	494	528	561	594	628	661	694
131	727	760	793	826	860	893	926	959	992	*024
132	12 057	090	123	156	189	222	254	287	320	352
133	385	418	450	483	516	548	581	613	646	678
134	710	743	775	808	840	872	905	937	969	*001
135	13 033	066	098	130	162	194	226	258	290	322
136	354	386	418	450	481	513	545	577	609	640
137	672	704	735	767	799	830	862	893	925	956
138	988	*019	*051	*082	*114	*145	*176	*208	*239	*270
139	14 301	333	364	395	426	457	489	520	551	582
140	613	644	675	706	737	768	799	829	860	891
141	922	953	983	*014	*045	*076	*106	*137	*168	*198
142	15 229	259	290	320	351	381	412	442	473	503
143	534	564	594	625	655	685	715	746	776	806
144	836	866	897	927	957	987	*017	*047	*077	*107
145	16 137	167	197	227	256	286	316	346	376	406
146	435	465	495	524	554	584	613	643	673	702
147	732	761	791	820	850	879	909	938	967	997
148	17 026	056	085	114	143	173	202	231	260	289
149	319	348	377	406	435	464	493	522	551	580
150	17 609	638	667	696	725	754	782	811	840	869

N	L 0	1	2	3	4	5	6	7	8	9

P P

	44	43	42
1	4.4	4.3	4.2
2	8.8	8.6	8.4
3	13.2	12.9	12.6
4	17.6	17.2	16.8
5	22.0	21.5	21.0
6	26.4	25.8	25.2
7	30.8	30.1	29.4
8	35.2	34.4	33.6
9	39.6	38.7	37.8

	41	40	39
1	4.1	4.0	3.9
2	8.2	8.0	7.8
3	12.3	12.0	11.7
4	16.4	16.0	15.6
5	20.5	20.0	19.5
6	24.6	24.0	23.4
7	28.7	28.0	27.3
8	32.8	32.0	31.2
9	36.9	36.0	35.1

	38	37	36
1	3.8	3.7	3.6
2	7.6	7.4	7.2
3	11.4	11.1	10.8
4	15.2	14.8	14.4
5	19.0	18.5	18.0
6	22.8	22.2	21.6
7	26.6	25.9	25.2
8	30.4	29.6	28.8
9	34.2	33.3	32.4

	35	34	33
1	3.5	3.4	3.3
2	7.0	6.8	6.6
3	10.5	10.2	9.9
4	14.0	13.6	13.2
5	17.5	17.0	16.5
6	21.0	20.4	19.8
7	24.5	23.8	23.1
8	28.0	27.2	26.4
9	31.5	30.6	29.7

	32	31	30
1	3.2	3.1	3.0
2	6.4	6.2	6.0
3	9.6	9.3	9.0
4	12.8	12.4	12.0
5	16.0	15.5	15.0
6	19.2	18.6	18.0
7	22.4	21.7	21.0
8	25.6	24.8	24.0
9	28.8	27.9	27.0

P P

960′	=0° 16′	S	4.68 557	T	4.68 558
1020	=0 17		4.68 557		4.68 558
1080	=0 18		4.68 557		4.68 558
1140	=0 19		4.68 557		4.68 558
1200	=0 20		4.68 557		4.68 558

1260′	=0° 21′	S	4.68 557	T	4.68 55
1320	=0 22		4.68 557		4.68 55
1380	=0 23		4.68 557		4.68 55
1440	=0 24		4.68 557		4.68 55
1500	=0 25		4.68 557		4.68 55

	L 0	1	2	3	4	5	6	7	8	9
0	17 609	638	667	696	725	754	782	811	840	869
1	898	926	955	984	*013	*041	*070	*099	*127	*156
2	18 184	213	241	270	298	327	355	384	412	441
3	469	498	526	554	583	611	639	667	696	724
4	752	780	808	837	865	893	921	949	977	*005
5	19 033	061	089	117	145	173	201	229	257	285
6	312	340	368	396	424	451	479	507	535	562
7	590	618	645	673	700	728	756	783	811	838
8	866	893	921	948	976	*003	*030	*058	*085	*112
9	20 140	167	194	222	249	276	303	330	358	385
10	412	439	466	493	520	548	575	602	629	656
11	683	710	737	763	790	817	844	871	898	925
12	952	978	*005	*032	*059	*085	*112	*139	*165	*192
13	21 219	245	272	299	325	352	378	405	431	458
14	484	511	537	564	590	617	643	669	696	722
15	748	775	801	827	854	880	906	932	958	985
16	22 011	037	063	089	115	141	167	194	220	246
17	272	298	324	350	376	401	427	453	479	505
18	531	557	583	608	634	660	686	712	737	763
19	789	814	840	866	891	917	943	968	994	*019
20	23 045	070	096	121	147	172	198	223	249	274
21	300	325	350	376	401	426	452	477	502	528
22	553	578	603	629	654	679	704	729	754	779
23	805	830	855	880	905	930	955	980	*005	*030
24	24 055	080	105	130	155	180	204	229	254	279
25	304	329	353	378	403	428	452	477	502	527
26	551	576	601	625	650	674	699	724	748	773
27	797	822	846	871	895	920	944	969	993	*018
28	25 042	066	091	115	139	164	188	212	237	261
29	285	310	334	358	382	406	431	455	479	503
30	527	551	575	600	624	648	672	696	720	744
31	768	792	816	840	864	888	912	935	959	983
32	26 007	031	055	079	102	126	150	174	198	221
33	245	269	293	316	340	364	387	411	435	458
34	482	505	529	553	576	600	623	647	670	694
35	717	741	764	788	811	834	858	881	905	928
36	951	975	998	*021	*045	*068	*091	*114	*138	*161
37	27 184	207	231	254	277	300	323	346	370	393
38	416	439	462	485	508	531	554	577	600	623
39	646	669	692	715	738	761	784	807	830	852
40	875	898	921	944	967	989	*012	*035	*058	*081
41	28 103	126	149	171	194	217	240	262	285	307
42	330	353	375	398	421	443	466	488	511	533
43	556	578	601	623	646	668	691	713	735	758
44	780	803	825	847	870	892	914	937	959	981
45	29 003	026	048	070	092	115	137	159	181	203
46	226	248	270	292	314	336	358	380	403	425
47	447	469	491	513	535	557	579	601	623	645
48	667	688	710	732	754	776	798	820	842	863
49	885	907	929	951	973	994	*016	*038	*060	*081
50	30 103	125	146	168	190	211	233	255	276	298

N	L 0	1	2	3	4	5	6	7	8	9

P P

	29	28
1	2.9	2.8
2	5.8	5.6
3	8.7	8.4
4	11.6	11.2
5	14.5	14.0
6	17.4	16.8
7	20.3	19.6
8	23.2	22.4
9	26.1	25.2

	27	26
1	2.7	2.6
2	5.4	5.2
3	8.1	7.8
4	10.8	10.4
5	13.5	13.0
6	16.2	15.6
7	18.9	18.2
8	21.6	20.8
9	24.3	23.4

	25
1	2.5
2	5.0
3	7.5
4	10.0
5	12.5
6	15.0
7	17.5
8	20.0
9	22.5

	24	23
1	2.4	2.3
2	4.8	4.6
3	7.2	6.9
4	9.6	9.2
5	12.0	11.5
6	14.4	13.8
7	16.8	16.1
8	19.2	18.4
9	21.6	20.7

	22	21
1	2.2	2.1
2	4.4	4.2
3	6.6	6.3
4	8.8	8.4
5	11.0	10.5
6	13.2	12.6
7	15.4	14.7
8	17.6	16.8
9	19.8	18.9

		S		T			S		T
1500′	=0° 25′	4.68 557		4.68 558	1800′	=0° 30′	4.68 557		4.68 559
1560	=0 26	4.68 557		4.68 558	1860	=0 31	4.68 557		4.68 559
1620	=0 27	4.68 557		4.68 558	1920	=0 32	4.68 557		4.68 559
1680	=0 28	4.68 557		4.68 558	1980	=0 33	4.68 557		4.68 559
1740	=0 29	4.68 557		4.68 559	2040	=0 34	4.68 557		4.68 559

N	L 0	1	2	3	4	5	6	7	8	9
200	30 103	125	146	168	190	211	233	255	276	298
201	320	341	363	384	406	428	449	471	492	514
202	535	557	578	600	621	643	664	685	707	728
203	750	771	792	814	835	856	878	899	920	942
204	963	984	*006	*027	*048	*069	*091	*112	*133	*154
205	31 175	197	218	239	260	281	302	323	345	366
206	387	408	429	450	471	492	513	534	555	576
207	597	618	639	660	681	702	723	744	765	785
208	806	827	848	869	890	911	931	952	973	994
209	32 015	035	056	077	098	118	139	160	181	201
210	222	243	263	284	305	325	346	366	387	408
211	428	449	469	490	510	531	552	572	593	613
212	634	654	675	695	715	736	756	777	797	818
213	838	858	879	899	919	940	960	980	*001	*021
214	33 041	062	082	102	122	143	163	183	203	224
215	244	264	284	304	325	345	365	385	405	425
216	445	465	486	506	526	546	566	586	606	626
217	646	666	686	706	726	746	766	786	806	826
218	846	866	885	905	925	945	965	985	*005	*025
219	34 044	064	084	104	124	143	163	183	203	223
220	242	262	282	301	321	341	361	380	400	420
221	439	459	479	498	518	537	557	577	596	616
222	635	655	674	694	713	733	753	772	792	811
223	830	850	869	889	908	928	947	967	986	*005
224	35 025	044	064	083	102	122	141	160	180	199
225	218	238	257	276	295	315	334	353	372	392
226	411	430	449	468	488	507	526	545	564	583
227	603	622	641	660	679	698	717	736	755	774
228	793	813	832	851	870	889	908	927	946	965
229	984	*003	*021	*040	*059	*078	*097	*116	*135	*154
230	36 173	192	211	229	248	267	286	305	324	342
231	361	380	399	418	436	455	474	493	511	530
232	549	568	586	605	624	642	661	680	698	717
233	736	754	773	791	810	829	847	866	884	903
234	922	940	959	977	996	*014	*033	*051	*070	*088
235	37 107	125	144	162	181	199	218	236	254	273
236	291	310	328	346	365	383	401	420	438	457
237	475	493	511	530	548	566	585	603	621	639
238	658	676	694	712	731	749	767	785	803	822
239	840	858	876	894	912	931	949	967	985	*003
240	38 021	039	057	075	093	112	130	148	166	184
241	202	220	238	256	274	292	310	328	346	364
242	382	399	417	435	453	471	489	507	525	543
243	561	578	596	614	632	650	668	686	703	721
244	739	757	775	792	810	828	846	863	881	899
245	917	934	952	970	987	*005	*023	*041	*058	*076
246	39 094	111	129	146	164	182	199	217	235	252
247	270	287	305	322	340	358	375	393	410	428
248	445	463	480	498	515	533	550	568	585	602
249	620	637	655	672	690	707	724	742	759	777
250	794	811	829	846	863	881	898	915	933	950
N	L 0	1	2	3	4	5	6	7	8	9

P P		
	22	21
1	2.2	2.1
2	4.4	4.2
3	6.6	6.3
4	8.8	8.4
5	11.0	10.5
6	13.2	12.6
7	15.4	14.7
8	17.6	16.8
9	19.8	18.9

	20
1	2.0
2	4.0
3	6.0
4	8.0
5	10.0
6	12.0
7	14.0
8	16.0
9	18.0

	19
1	1.9
2	3.8
3	5.7
4	7.6
5	9.5
6	11.4
7	13.3
8	15.2
9	17.1

	18
1	1.8
2	3.6
3	5.4
4	7.2
5	9.0
6	10.8
7	12.6
8	14.4
9	16.2

	17
1	1.7
2	3.4
3	5.1
4	6.8
5	8.5
6	10.2
7	11.9
8	13.6
9	15.3

1980″	=0° 33′	S	4.68 557	T	4.68 559	2280″	=0° 38′	S	4.68 557	T	4.68 559
2040	=0 34		4.68 557		4.68 559	2340	=0 39		4.68 557		4.68 559
2100	=0 35		4.68 557		4.68 559	2400	=0 40		4.68 557		4.68 559
2160	=0 36		4.68 557		4.68 559	2460	=0 41		4.68 556		4.68 560
2220	=0 37		4.68 557		4.68 559	2520	=0 42		4.68 556		4.68 560

N	L 0	1	2	3	4	5	6	7	8	9	P P
250	39 794	811	829	846	863	881	898	915	933	950	
											18
251	967	985	*002	*019	*037	*054	*071	*088	*106	*123	1 1.8
252	40 140	157	175	192	209	226	243	261	278	295	2 3.6
253	312	329	346	364	381	398	415	432	449	466	3 5.4
254	483	500	518	535	552	569	586	603	620	637	4 7.2
255	654	671	688	705	722	739	756	773	790	807	5 9.0
256	824	841	858	875	892	909	926	943	960	976	6 10.8
257	993	*010	*027	*044	*061	*078	*095	*111	*128	*145	7 12.6
258	41 162	179	196	212	229	246	263	280	296	313	8 14.4
259	330	347	363	380	397	414	430	447	464	481	9 16.2
260	497	514	531	547	564	581	597	614	631	647	
											17
261	664	681	697	714	731	747	764	780	797	814	1 1.7
262	830	847	863	880	896	913	929	946	963	979	2 3.4
263	996	*012	*029	*045	*062	*078	*095	*111	*127	*144	3 5.1
264	42 160	177	193	210	226	243	259	275	292	308	4 6.8
265	325	341	357	374	390	406	423	439	455	472	5 8.5
266	488	504	521	537	553	570	586	602	619	635	6 10.2
267	651	667	684	700	716	732	749	765	781	797	7 11.9
268	813	830	846	862	878	894	911	927	943	959	8 13.6
269	975	991	*008	*024	*040	*056	*072	*088	*104	*120	9 15.3
270	43 136	152	169	185	201	217	233	249	265	281	
											16
271	297	313	329	345	361	377	393	409	425	441	1 1.6
272	457	473	489	505	521	537	553	569	584	600	2 3.2
273	616	632	648	664	680	696	712	727	743	759	3 4.8
274	775	791	807	823	838	854	870	886	902	917	4 6.4
275	933	949	965	981	996	*012	*028	*044	*059	*075	5 8.0
276	44 091	107	122	138	154	170	185	201	217	232	6 9.6
277	248	264	279	295	311	326	342	358	373	389	7 11.2
278	404	420	436	451	467	483	498	514	529	545	8 12.8
279	560	576	592	607	623	638	654	669	685	700	9 14.4
280	716	731	747	762	778	793	809	824	840	855	
											15
281	871	886	902	917	932	948	963	979	994	*010	1 1.5
282	45 025	040	056	071	086	102	117	133	148	163	2 3.0
283	179	194	209	225	240	255	271	286	301	317	3 4.5
284	332	347	362	378	393	408	423	439	454	469	4 6.0
285	484	500	515	530	545	561	576	591	606	621	5 7.5
286	637	652	667	682	697	712	728	743	758	773	6 9.0
287	788	803	818	834	849	864	879	894	909	924	7 10.5
288	939	954	969	984	*000	*015	*030	*045	*060	*075	8 12.0
289	46 090	105	120	135	150	165	180	195	210	225	9 13.5
290	240	255	270	285	300	315	330	345	359	374	
											14
291	389	404	419	434	449	464	479	494	509	523	1 1.4
292	538	553	568	583	598	613	627	642	657	672	2 2.8
293	687	702	716	731	746	761	776	790	805	820	3 4.2
294	835	850	864	879	894	909	923	938	953	967	4 5.6
295	982	997	*012	*026	*041	*056	*070	*085	*100	*114	5 7.0
296	47 129	144	159	173	188	202	217	232	246	261	6 8.4
297	276	290	305	319	334	349	363	378	392	407	7 9.8
298	422	436	451	465	480	494	509	524	538	553	8 11.2
299	567	582	596	611	625	640	654	669	683	698	9 12.6
300	712	727	741	756	770	784	799	813	828	842	

N	L 0	1	2	3	4	5	6	7	8	9	P P

2460″	=0° 41′	S	4.68 556	T	4.68 560	2760″	=0° 46′	S	4.68 556	T	4.68 560
2520	=0 42		4.68 556		4.68 560	2820	=0 47		4.68 556		4.68 560
2580	=0 43		4.68 556		4.68 560	2880	=0 48		4.68 556		4.68 560
2640	=0 44		4.68 556		4.68 560	2940	=0 49		4.68 556		4.68 560
2700	=0 45		4.68 556		4.68 560	3000	=0 50		4.68 556		4.68 561

N	L 0	1	2	3	4	5	6	7	8	9
300	47 712	727	741	756	770	784	799	813	828	842
301	857	871	885	900	914	929	943	958	972	986
302	48 001	015	029	044	058	073	087	101	116	130
303	144	159	173	187	202	216	230	244	259	273
304	287	302	316	330	344	359	373	387	401	416
305	430	444	458	473	487	501	515	530	544	558
306	572	586	601	615	629	643	657	671	686	700
307	714	728	742	756	770	785	799	813	827	841
308	855	869	883	897	911	926	940	954	968	982
309	996	*010	*024	*038	*052	*066	*080	*094	*108	*122
310	49 136	150	164	178	192	206	220	234	248	262
311	276	290	304	318	332	346	360	374	388	402
312	415	429	443	457	471	485	499	513	527	541
313	554	568	582	596	610	624	638	651	665	679
314	693	707	721	734	748	762	776	790	803	817
315	831	845	859	872	886	900	914	927	941	955
316	969	982	996	*010	*024	*037	*051	*065	*079	*092
317	50 106	120	133	147	161	174	188	202	215	229
318	243	256	270	284	297	311	325	338	352	365
319	379	393	406	420	433	447	461	474	488	501
320	515	529	542	556	569	583	596	610	623	637
321	651	664	678	691	705	718	732	745	759	772
322	786	799	813	826	840	853	866	880	893	907
323	920	934	947	961	974	987	*001	*014	*028	*041
324	51 055	068	081	095	108	121	135	148	162	175
325	188	202	215	228	242	255	268	282	295	308
326	322	335	348	362	375	388	402	415	428	441
327	455	468	481	495	508	521	534	548	561	574
328	587	601	614	627	640	654	667	680	693	706
329	720	733	746	759	772	786	799	812	825	838
330	851	865	878	891	904	917	930	943	957	970
331	983	996	*009	*022	*035	*048	*061	*075	*088	*101
332	52 114	127	140	153	166	179	192	205	218	231
333	244	257	270	284	297	310	323	336	349	362
334	375	388	401	414	427	440	453	466	479	492
335	504	517	530	543	556	569	582	595	608	621
336	634	647	660	673	686	699	711	724	737	750
337	763	776	789	802	815	827	840	853	866	879
338	892	905	917	930	943	956	969	982	994	*007
339	53 020	033	046	058	071	084	097	110	122	135
340	148	161	173	186	199	212	224	237	250	263
341	275	288	301	314	326	339	352	364	377	390
342	403	415	428	441	453	466	479	491	504	517
343	529	542	555	567	580	593	605	618	631	643
344	656	668	681	694	706	719	732	744	757	769
345	782	794	807	820	832	845	857	870	882	895
346	908	920	933	945	958	970	983	995	*008	*020
347	54 033	045	058	070	083	095	108	120	133	145
348	158	170	183	195	208	220	233	245	258	270
349	283	295	307	320	332	345	357	370	382	394
350	407	419	432	444	456	469	481	494	506	518

N	L 0	1	2	3	4	5	6	7	8	9

P P

15
1 1.5
2 3.0
3 4.5
4 6.0
5 7.5
6 9.0
7 10.5
8 12.0
9 13.5

14
1 1.4
2 2.8
3 4.2
4 5.6
5 7.0
6 8.4
7 9.8
8 11.2
9 12.6

13
1 1.3
2 2.6
3 3.9
4 5.2
5 6.5
6 7.8
7 9.1
8 10.4
9 11.7

12
1 1.2
2 2.4
3 3.6
4 4.8
5 6.0
6 7.2
7 8.4
8 9.6
9 10.8

3000′ = 0° 50′	S	4.68 556	T	4.68 561	3300′ = 0° 55′	S	4.68 556	T	4.68 561	
3060 = 0 51		4.68 556		4.68 561	3360 = 0 56		4.68 556		4.68 561	
3120 = 0 52		4.68 556		4.68 561	3420 = 0 57		4.68 555		4.68 561	
3180 = 0 53		4.68 556		4.68 561	3480 = 0 58		4.68 555		4.68 562	
3240 = 0 54		4.68 556		4.68 561	3540 = 0 59		4.68 555		4.68 562	

N	L 0	1	2	3	4	5	6	7	8	9
350	54 407	419	432	444	456	469	481	494	506	518
351	531	543	555	568	580	593	605	617	630	642
352	654	667	679	691	704	716	728	741	753	765
353	777	790	802	814	827	839	851	864	876	888
354	900	913	925	937	949	962	974	986	998	*011
355	55 023	035	047	060	072	084	096	108	121	133
356	145	157	169	182	194	206	218	230	242	255
357	267	279	291	303	315	328	340	352	364	376
358	388	400	413	425	437	449	461	473	485	497
359	509	522	534	546	558	570	582	594	606	618
360	630	642	654	666	678	691	703	715	727	739
361	751	763	775	787	799	811	823	835	847	859
362	871	883	895	907	919	931	943	955	967	979
363	991	*003	*015	*027	*038	*050	*062	*074	*086	*098
364	56 110	122	134	146	158	170	182	194	205	217
365	229	241	253	265	277	289	301	312	324	336
366	348	360	372	384	396	407	419	431	443	455
367	467	478	490	502	514	526	538	549	561	573
368	585	597	608	620	632	644	656	667	679	691
369	703	714	726	738	750	761	773	785	797	808
370	820	832	844	855	867	879	891	902	914	926
371	937	949	961	972	984	996	*008	*019	*031	*043
372	57 054	066	078	089	101	113	124	136	148	159
373	171	183	194	206	217	229	241	252	264	276
374	287	299	310	322	334	345	357	368	380	392
375	403	415	426	438	449	461	473	484	496	507
376	519	530	542	553	565	576	588	600	611	623
377	634	646	657	669	680	692	703	715	726	738
378	749	761	772	784	795	807	818	830	841	852
379	864	875	887	898	910	921	933	944	955	967
380	978	990	*001	*013	*024	*035	*047	*058	*070	*081
381	58 092	104	115	127	138	149	161	172	184	195
382	206	218	229	240	252	263	274	286	297	309
383	320	331	343	354	365	377	388	399	410	422
384	433	444	456	467	478	490	501	512	524	535
385	546	557	569	580	591	602	614	625	636	647
386	659	670	681	692	704	715	726	737	749	760
387	771	782	794	805	816	827	838	850	861	872
388	883	894	906	917	928	939	950	961	973	984
389	995	*006	*017	*028	*040	*051	*062	*073	*084	*095
390	59 106	118	129	140	151	162	173	184	195	207
391	218	229	240	251	262	273	284	295	306	318
392	329	340	351	362	373	384	395	406	417	428
393	439	450	461	472	483	494	506	517	528	539
394	550	561	572	583	594	605	616	627	638	649
395	660	671	682	693	704	715	726	737	748	759
396	770	780	791	802	813	824	835	846	857	868
397	879	890	901	912	923	934	945	956	966	977
398	988	999	*010	*021	*032	*043	*054	*065	*076	*086
399	60 097	108	119	130	141	152	163	173	184	195
400	206	217	228	239	249	260	271	282	293	304

P P	
13	
1	1.3
2	2.6
3	3.9
4	5.2
5	6.5
6	7.8
7	9.1
8	10.4
9	11.7
12	
1	1.2
2	2.4
3	3.6
4	4.8
5	6.0
6	7.2
7	8.4
8	9.6
9	10.8
11	
1	1.1
2	2.2
3	3.3
4	4.4
5	5.5
6	6.6
7	7.7
8	8.8
9	9.9
10	
1	1.0
2	2.0
3	3.0
4	4.0
5	5.0
6	6.0
7	7.0
8	8.0
9	9.0

N | L 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | P P

3480″	=0° 58′	S	4.68 555	T	4.68 562	3780″	=1° 3′	S	4.68 555	T	4.68 562
3540	=0 59		4.68 555		4.68 562	3840	=1 4		4.68 555		4.68 563
3600	=1 0		4.68 555		4.68 562	3900	=1 5		4.68 555		4.68 563
3660	=1 1		4.68 555		4.68 562	3960	=1 6		4.68 555		4.68 563
3720	=1 2		4.68 555		4.68 562	4020	=1 7		4.68 555		4.68 563

N	L 0	1	2	3	4	5	6	7	8	9	P P
400	60 206	217	228	239	249	260	271	282	293	304	
401	314	325	336	347	358	369	379	390	401	412	
402	423	433	444	455	466	477	487	498	509	520	
403	531	541	552	563	574	584	595	606	617	627	
404	638	649	660	670	681	692	703	713	724	735	
405	746	756	767	778	788	799	810	821	831	842	
406	853	863	874	885	895	906	917	927	938	949	11
407	959	970	981	991	*002	*013	*023	*034	*045	*055	1 1.1
408	61 066	077	087	098	109	119	130	140	151	162	2 2.2
409	172	183	194	204	215	225	236	247	257	268	3 3.3
410	278	289	300	310	321	331	342	352	363	374	4 4.4
411	384	395	405	416	426	437	448	458	469	479	5 5.5
412	490	500	511	521	532	542	553	563	574	584	6 6.6
413	595	606	616	627	637	648	658	669	679	690	7 7.7
414	700	711	721	731	742	752	763	773	784	794	8 8.8
415	805	815	826	836	847	857	868	878	888	899	9 9.9
416	909	920	930	941	951	962	972	982	993	*003	
417	62 014	024	034	045	055	066	076	086	097	107	
418	118	128	138	149	159	170	180	190	201	211	
419	221	232	242	252	263	273	284	294	304	315	
420	325	335	346	356	366	377	387	397	408	418	
421	428	439	449	459	469	480	490	500	511	521	
422	531	542	552	562	572	583	593	603	613	624	10
423	634	644	655	665	675	685	696	706	716	726	1 1.0
424	737	747	757	767	778	788	798	808	818	829	2 2.0
425	839	849	859	870	880	890	900	910	921	931	3 3.0
426	941	951	961	972	982	992	*002	*012	*022	*033	4 4.0
427	63 043	053	063	073	083	094	104	114	124	134	5 5.0
428	144	155	165	175	185	195	205	215	225	236	6 6.0
429	246	256	266	276	286	296	306	317	327	337	7 7.0
430	347	357	367	377	387	397	407	417	428	438	8 8.0
431	448	458	468	478	488	498	508	518	528	538	9 9.0
432	548	558	568	579	589	599	609	619	629	639	
433	649	659	669	679	689	699	709	719	729	739	
434	749	759	769	779	789	799	809	819	829	839	
435	849	859	869	879	889	899	909	919	929	939	
436	949	959	969	979	988	998	*008	*018	*028	*038	
437	64 048	058	068	078	088	098	108	118	128	137	9
438	147	157	167	177	187	197	207	217	227	237	1 0.9
439	246	256	266	276	286	296	306	316	326	335	2 1.8
440	345	355	365	375	385	395	404	414	424	434	3 2.7
441	444	454	464	473	483	493	503	513	523	532	4 3.6
442	542	552	562	572	582	591	601	611	621	631	5 4.5
443	640	650	660	670	680	689	699	709	719	729	6 5.4
444	738	748	758	768	777	787	797	807	816	826	7 6.3
445	836	846	856	865	875	885	895	904	914	924	8 7.2
446	933	943	953	963	972	982	992	*002	*011	*021	9 8.1
447	65 031	040	050	060	070	079	089	099	108	118	
448	128	137	147	157	167	176	186	196	205	215	
449	225	234	244	254	263	273	283	292	302	312	
450	321	331	341	350	360	369	379	389	398	408	

N	L 0	1	2	3	4	5	6	7	8	9	P P

3960″	= 1° 6	S	4.68 555	T	4.68 563	4260″	= 1° 11′	S	4.68 554	T	4.68 564
4020	= 1 7		4.68 555		4.68 563	4320	= 1 12		4.68 554		4.68 564
4080	= 1 8		4.68 555		4.68 563	4380	= 1 13		4.68 554		4.68 564
4140	= 1 9		4.68 555		4.68 563	4440	= 1 14		4.68 554		4.68 564
4200	= 1 10		4.68 554		4.68 563	4500	= 1 15		4.68 554		4.68 564

450—500

N	L 0	1	2	3	4	5	6	7	8	9
450	65 321	331	341	350	360	369	379	389	398	408
451	418	427	437	447	456	466	475	485	495	504
452	514	523	533	543	552	562	571	581	591	600
453	610	619	629	639	648	658	667	677	686	696
454	706	715	725	734	744	753	763	772	782	792
455	801	811	820	830	839	849	858	868	877	887
456	896	906	916	925	935	944	954	963	973	982
457	992	*001	*011	*020	*030	*039	*049	*058	*068	*077
458	66 087	096	106	115	124	134	143	153	162	172
459	181	191	200	210	219	229	238	247	257	266
460	276	285	295	304	314	323	332	342	351	361
461	370	380	389	398	408	417	427	436	445	455
462	464	474	483	492	502	511	521	530	539	549
463	558	567	577	586	596	605	614	624	633	642
464	652	661	671	680	689	699	708	717	727	736
465	745	755	764	773	783	792	801	811	820	829
466	839	848	857	867	876	885	894	904	913	922
467	932	941	950	960	969	978	987	997	*006	*015
468	67 025	034	043	052	062	071	080	089	099	108
469	117	127	136	145	154	164	173	182	191	201
470	210	219	228	237	247	256	265	274	284	293
471	302	311	321	330	339	348	357	367	376	385
472	394	403	413	422	431	440	449	459	468	477
473	486	495	504	514	523	532	541	550	560	569
474	578	587	596	605	614	624	633	642	651	660
475	669	679	688	697	706	715	724	733	742	752
476	761	770	779	788	797	806	815	825	834	843
477	852	861	870	879	888	897	906	916	925	934
478	943	952	961	970	979	988	997	*006	*015	*024
479	68 034	043	052	061	070	079	088	097	106	115
480	124	133	142	151	160	169	178	187	196	205
481	215	224	233	242	251	260	269	278	287	296
482	305	314	323	332	341	350	359	368	377	386
483	395	404	413	422	431	440	449	458	467	476
484	485	494	502	511	520	529	538	547	556	565
485	574	583	592	601	610	619	628	637	646	655
486	664	673	681	690	699	708	717	726	735	744
487	753	762	771	780	789	797	806	815	824	833
488	842	851	860	869	878	886	895	904	913	922
489	931	940	949	958	966	975	984	993	*002	*011
490	69 020	028	037	046	055	064	073	082	090	099
491	108	117	126	135	144	152	161	170	179	188
492	197	205	214	223	232	241	249	258	267	276
493	285	294	302	311	320	329	338	346	355	364
494	373	381	390	399	408	417	425	434	443	452
495	461	469	478	487	496	504	513	522	531	539
496	548	557	566	574	583	592	601	609	618	627
497	636	644	653	662	671	679	688	697	705	714
498	723	732	740	749	758	767	775	784	793	801
499	810	819	827	836	845	854	862	871	880	888
500	897	906	914	923	932	940	949	958	966	975

N	L 0	1	2	3	4	5	6	7	8	9

P P

10

1	1.0
2	2.0
3	3.0
4	4.0
5	5.0
6	6.0
7	7.0
8	8.0
9	9.0

9

1	0.9
2	1.8
3	2.7
4	3.6
5	4.5
6	5.4
7	6.3
8	7.2
9	8.1

8

1	0.8
2	1.6
3	2.4
4	3.2
5	4.0
6	4.8
7	5.6
8	6.4
9	7.2

P P

4500″	=1° 15′	S	4.68 554	T	4.68 564	4800″	=1° 20′	S	4.68 554	T	4.68 565
4560	=1 16		4.68 554		4.68 565	4860	=1 21		4.68 553		4.68 566
4620	=1 17		4.68 554		4.68 565	4920	=1 22		4.68 553		4.68 566
4680	=1 18		4.68 554		4.68 565	4980	=1 23		4.68 553		4.68 566
4740	=1 19		4.68 554		4.68 565	5040	=1 24		4.68 553		4.68 566

N	L 0	1	2	3	4	5	6	7	8	9	P P
500	69 897	906	914	923	932	940	949	958	966	975	
501	984	992	*001	*010	*018	*027	*036	*044	*053	*062	
502	70 070	079	088	096	105	114	122	131	140	148	
503	157	165	174	183	191	200	209	217	226	234	
504	243	252	260	269	278	286	295	303	312	321	9
505	329	338	346	355	364	372	381	389	398	406	1 0.9
506	415	424	432	441	449	458	467	475	484	492	2 1.8
507	501	509	518	526	535	544	552	561	569	578	3 2.7
508	586	595	603	612	621	629	638	646	655	663	4 3.6
509	672	680	689	697	706	714	723	731	740	749	5 4.5
510	757	766	774	783	791	800	808	817	825	834	6 5.4
511	842	851	859	868	876	885	893	902	910	919	7 6.3
512	927	935	944	952	961	969	978	986	995	*003	8 7.2
513	71 012	020	029	037	046	054	063	071	079	088	9 8.1
514	096	105	113	122	130	139	147	155	164	172	
515	181	189	198	206	214	223	231	240	248	257	
516	265	273	282	290	299	307	315	324	332	341	
517	349	357	366	374	383	391	399	408	416	425	
518	433	441	450	458	466	475	483	492	500	508	
519	517	525	533	542	550	559	567	575	584	592	
520	600	609	617	625	634	642	650	659	667	675	
521	684	692	700	709	717	725	734	742	750	759	
522	767	775	784	792	800	809	817	825	834	842	8
523	850	858	867	875	883	892	900	908	917	925	1 0.8
524	933	941	950	958	966	975	983	991	999	*008	2 1.6
525	72 016	024	032	041	049	057	066	074	082	090	3 2.4
526	099	107	115	123	132	140	148	156	165	173	4 3.2
527	181	189	198	206	214	222	230	239	247	255	5 4.0
528	263	272	280	288	296	304	313	321	329	337	6 4.8
529	346	354	362	370	378	387	395	403	411	419	7 5.6
530	428	436	444	452	460	469	477	485	493	501	8 6.4
531	509	518	526	534	542	550	558	567	575	583	9 7.2
532	591	599	607	616	624	632	640	648	656	665	
533	673	681	689	697	705	713	722	730	738	746	
534	754	762	770	779	787	795	803	811	819	827	
535	835	843	852	860	868	876	884	892	900	908	
536	916	925	933	941	949	957	965	973	981	989	
537	997	*006	*014	*022	*030	*038	*046	*054	*062	*070	
538	73 078	086	094	102	111	119	127	135	143	151	
539	159	167	175	183	191	199	207	215	223	231	7
540	239	247	255	263	272	280	288	296	304	312	1 0.7
541	320	328	336	344	352	360	368	376	384	392	2 1.4
542	400	408	416	424	432	440	448	456	464	472	3 2.1
543	480	488	496	504	512	520	528	536	544	552	4 2.8
544	560	568	576	584	592	600	608	616	624	632	5 3.5
545	640	648	656	664	672	679	687	695	703	711	6 4.2
546	719	727	735	743	751	759	767	775	783	791	7 4.9
547	799	807	815	823	830	838	846	854	862	870	8 5.6
548	878	886	894	902	910	918	926	933	941	949	9 6.3
549	957	965	973	981	989	997	*005	*013	*020	*028	
550	74 036	044	052	060	068	076	084	092	099	107	
N	L 0	1	2	3	4	5	6	7	8	9	P P

4980"	= 1° 23′	S	4.68 553	T	4.68 566	5280"	= 1° 28′	S	4.68 553	T	4.68 567
5040	= 1 24		4.68 553		4.68 566	5340	= 1 29		4.68 553		4.68 567
5100	= 1 25		4.68 553		4.68 566	5400	= 1 30		4.68 553		4.68 567
5160	= 1 26		4.68 553		4.68 567	5460	= 1 31		4.68 552		4.68 568
5220	= 1 27		4.68 553		4.68 567	5520	= 1 32		4.68 552		4.68 568

550—600

N	L 0	1	2	3	4	5	6	7	8	9
550	74 036	044	052	060	068	076	084	092	099	107
551	115	123	131	139	147	155	162	170	178	186
552	194	202	210	218	225	233	241	249	257	265
553	273	280	288	296	304	312	320	327	335	343
554	351	359	367	374	382	390	398	406	414	421
555	429	437	445	453	461	468	476	484	492	500
556	507	515	523	531	539	547	554	562	570	578
557	586	593	601	609	617	624	632	640	648	656
558	663	671	679	687	695	702	710	718	726	733
559	741	749	757	764	772	780	788	796	803	811
560	819	827	834	842	850	858	865	873	881	889
561	896	904	912	920	927	935	943	950	958	966
562	974	981	989	997	*005	*012	*020	*028	*035	*043
563	75 051	059	066	074	082	089	097	105	113	120
564	128	136	143	151	159	166	174	182	189	197
565	205	213	220	228	236	243	251	259	266	274
566	282	289	297	305	312	320	328	335	343	351
567	358	366	374	381	389	397	404	412	420	427
568	435	442	450	458	465	473	481	488	496	504
569	511	519	526	534	542	549	557	565	572	580
570	587	595	603	610	618	626	633	641	648	656
571	664	671	679	686	694	702	709	717	724	732
572	740	747	755	762	770	778	785	793	800	808
573	815	823	831	838	846	853	861	868	876	884
574	891	899	906	914	921	929	937	944	952	959
575	967	974	982	989	997	*005	*012	*020	*027	*035
576	76 042	050	057	065	072	080	087	095	103	110
577	118	125	133	140	148	155	163	170	178	185
578	193	200	208	215	223	230	238	245	253	260
579	268	275	283	290	298	305	313	320	328	335
580	343	350	358	365	373	380	388	395	403	410
581	418	425	433	440	448	455	462	470	477	485
582	492	500	507	515	522	530	537	545	552	559
583	567	574	582	589	597	604	612	619	626	634
584	641	649	656	664	671	678	686	693	701	708
585	716	723	730	738	745	753	760	768	775	782
586	790	797	805	812	819	827	834	842	849	856
587	864	871	879	886	893	901	908	916	923	930
588	938	945	953	960	967	975	982	989	997	*004
589	77 012	019	026	034	041	048	056	063	070	078
590	085	093	100	107	115	122	129	137	144	151
591	159	166	173	181	188	195	203	210	217	225
592	232	240	247	254	262	269	276	283	291	298
593	305	313	320	327	335	342	349	357	364	371
594	379	386	393	401	408	415	422	430	437	444
595	452	459	466	474	481	488	495	503	510	517
596	525	532	539	546	554	561	568	576	583	590
597	597	605	612	619	627	634	641	648	656	663
598	670	677	685	692	699	706	714	721	728	735
599	743	750	757	764	772	779	786	793	801	808
600	815	822	830	837	844	851	859	866	873	880

P P	
8	
1	0.8
2	1.6
3	2.4
4	3.2
5	4.0
6	4.8
7	5.6
8	6.4
9	7.2

P P	
7	
1	0.7
2	1.4
3	2.1
4	2.8
5	3.5
6	4.2
7	4.9
8	5.6
9	6.3

N	L 0	1	2	3	4	5	6	7	8	9	P P

5460″	=1° 31′	S	4.68 552	T	4.68 568	5760″	=1° 36′	S	4.68 552	T	4.68 569
5520	=1 32		4.68 552		4.68 568	5820	=1 37		4.68 552		4.68 569
5580	=1 33		4.68 552		4.68 568	5880	=1 38		4.68 552	*	4.68 569
5640	=1 34		4.68 552		4.68 568	5940	=1 39		4.68 551		4.68 569
5700	=1 35		4.68 552		4.68 569	6000	=1 40		4.68 551		4.68 570

N	L 0	1	2	3	4	5	6	7	8	9	P	P
600	77 815	822	830	837	844	851	859	866	873	880		
601	887	895	902	909	916	924	931	938	945	952		
602	960	967	974	981	988	996	*003	*010	*017	*025		
603	78 032	039	046	053	061	068	075	082	089	097		
604	104	111	118	125	132	140	147	154	161	168		
605	176	183	190	197	204	211	219	226	233	240		
606	247	254	262	269	276	283	290	297	305	312		
607	319	326	333	340	347	355	362	369	376	383	8	
608	390	398	405	412	419	426	433	440	447	455	1	0.8
609	462	469	476	483	490	497	504	512	519	526	2	1.6
610	533	540	547	554	561	569	576	583	590	597	3	2.4
611	604	611	618	625	633	640	647	654	661	668	4	3.2
612	675	682	689	696	704	711	718	725	732	739	5	4.0
613	746	753	760	767	774	781	789	796	803	810	6	4.8
614	817	824	831	838	845	852	859	866	873	880	7	5.6
615	888	895	902	909	916	923	930	937	944	951	8	6.4
616	958	965	972	979	986	993	*000	*007	*014	*021	9	7.2
617	79 029	036	043	050	057	064	071	078	085	092		
618	099	106	113	120	127	134	141	148	155	162		
619	169	176	183	190	197	204	211	218	225	232		
620	239	246	253	260	267	274	281	288	295	302		
621	309	316	323	330	337	344	351	358	365	372	7	
622	379	386	393	400	407	414	421	428	435	442	1	0.7
623	449	456	463	470	477	484	491	498	505	511	2	1.4
624	518	525	532	539	546	553	560	567	574	581	3	2.1
625	588	595	602	609	616	623	630	637	644	650	4	2.8
626	657	664	671	678	685	692	699	706	713	720	5	3.5
627	727	734	741	748	754	761	768	775	782	789	6	4.2
628	796	803	810	817	824	831	837	844	851	858	7	4.9
629	865	872	879	886	893	900	906	913	920	927	8	5.6
630	934	941	948	955	962	969	975	982	989	996	9	6.3
631	80 003	010	017	024	030	037	044	051	058	065		
632	072	079	085	092	099	106	113	120	127	134		
633	140	147	154	161	168	175	182	188	195	202		
634	209	216	223	229	236	243	250	257	264	271		
635	277	284	291	298	305	312	318	325	332	339		
636	346	353	359	366	373	380	387	393	400	407		
637	414	421	428	434	441	448	455	462	468	475	6	
638	482	489	496	502	509	516	523	530	536	543	1	0.6
639	550	557	564	570	577	584	591	598	604	611	2	1.2
640	618	625	632	638	645	652	659	665	672	679	3	1.8
641	686	693	699	706	713	720	726	733	740	747	4	2.4
642	754	760	767	774	781	787	794	801	808	814	5	3.0
643	821	828	835	841	848	855	862	868	875	882	6	3.6
644	889	895	902	909	916	922	929	936	943	949	7	4.2
645	956	963	969	976	983	990	996	*003	*010	*017	8	4.8
646	81 023	030	037	043	050	057	064	070	077	084	9	5.4
647	090	097	104	111	117	124	131	137	144	151		
648	158	164	171	178	184	191	198	204	211	218		
649	224	231	238	245	251	258	265	271	278	285		
650	291	298	305	311	318	325	331	338	345	351		

N	L 0	1	2	3	4	5	6	7	8	9	P	P

6000″	= 1° 40	S	4.68 551	T	4.68 570	6300″	= 1° 45	S	4.68 551	T	4.68 57
6060	= 1 41		4.68 551		4.68 570	6360	= 1 46		4.68 551		4.68 57
6120	= 1 42		4.68 551		4.68 570	6420	= 1 47		4.68 550		4.68 57
6180	= 1 43		4.68 551		4.68 570	6480	= 1 48		4.68 550		4.68 57
6240	= 1 44		4.68 551		4.68 571	6540	= 1 49		4.68 550		4.68 57

650—700

N	L 0	1	2	3	4	5	6	7	8	9
650	81 291	298	305	311	318	325	331	338	345	351
651	358	365	371	378	385	391	398	405	411	418
652	425	431	438	445	451	458	465	471	478	485
653	491	498	505	511	518	525	531	538	544	551
654	558	564	571	578	584	591	598	604	611	617
655	624	631	637	644	651	657	664	671	677	684
656	690	697	704	710	717	723	730	737	743	750
657	757	763	770	776	783	790	796	803	809	816
658	823	829	836	842	849	856	862	869	875	882
659	889	895	902	908	915	921	928	935	941	948
660	954	961	968	974	981	987	994	*000	*007	*014
661	82 020	027	033	040	046	053	060	066	073	079
662	086	092	099	105	112	119	125	132	138	145
663	151	158	164	171	178	184	191	197	204	210
664	217	223	230	236	243	249	256	263	269	276
665	282	289	295	302	308	315	321	328	334	341
666	347	354	360	367	373	380	387	393	400	406
667	413	419	426	432	439	445	452	458	465	471
668	478	484	491	497	504	510	517	523	530	536
669	543	549	556	562	569	575	582	588	595	601
670	607	614	620	627	633	640	646	653	659	666
671	672	679	685	692	698	705	711	718	724	730
672	737	743	750	756	763	769	776	782	789	795
673	802	808	814	821	827	834	840	847	853	860
674	866	872	879	885	892	898	905	911	918	924
675	930	937	943	950	956	963	969	975	982	988
676	995	*001	*008	*014	*020	*027	*033	*040	*046	*052
677	83 059	065	072	078	085	091	097	104	110	117
678	123	129	136	142	149	155	161	168	174	181
679	187	193	200	206	213	219	225	232	238	245
680	251	257	264	270	276	283	289	296	302	308
681	315	321	327	334	340	347	353	359	366	372
682	378	385	391	398	404	410	417	423	429	436
683	442	448	455	461	467	474	480	487	493	499
684	506	512	518	525	531	537	544	550	556	563
685	569	575	582	588	594	601	607	613	620	626
686	632	639	645	651	658	664	670	677	683	689
687	696	702	708	715	721	727	734	740	746	753
688	759	765	771	778	784	790	797	803	809	816
689	822	828	835	841	847	853	860	866	872	879
690	885	891	897	904	910	916	923	929	935	942
691	948	954	960	967	973	979	985	992	998	*004
692	84 011	017	023	029	036	042	048	055	061	067
693	073	080	086	092	098	105	111	117	123	130
694	136	142	148	155	161	167	173	180	186	192
695	198	205	211	217	223	230	236	242	248	255
696	261	267	273	280	286	292	298	305	311	317
697	323	330	336	342	348	354	361	367	373	379
698	386	392	398	404	410	417	423	429	435	442
699	448	454	460	466	473	479	485	491	497	504
700	510	516	522	528	535	541	547	553	559	566

N	L 0	1	2	3	4	5	6	7	8	9

P P

	7
1	0.7
2	1.4
3	2.1
4	2.8
5	3.5
6	4.2
7	4.9
8	5.6
9	6.3

	6
1	0.6
2	1.2
3	1.8
4	2.4
5	3.0
6	3.6
7	4.2
8	4.8
9	5.4

P P

6480"	=1° 48'	S	4.68 550	T	4.68 572	6780"	=1° 53'	S	4.68 550	T	4.68 573
6540	=1 49		4.68 550		4.68 572	6840	=1 54		4.68 550		4.68 573
6600	=1 50		4.68 550		4.68 572	6900	=1 55		4.68 549		4.68 574
6660	=1 51		4.68 550		4.68 573	6960	=1 56		4.68 549		4.68 574
6720	=1 52		4.68 550		4.68 573	7020	=1 57		4.68 549		4.68 574

N	L 0	1	2	3	4	5	6	7	8	9	P P
700	84 510	516	522	528	535	541	547	553	559	566	
701	572	578	584	590	597	603	609	615	621	628	
702	634	640	646	652	658	665	671	677	683	689	
703	696	702	708	714	720	726	733	739	745	751	
704	757	763	770	776	782	788	794	800	807	813	
705	819	825	831	837	844	850	856	862	868	874	
706	880	887	893	899	905	911	917	924	930	936	
707	942	948	954	960	967	973	979	985	991	997	
708	85 003	009	016	022	028	034	040	046	052	058	
709	065	071	077	083	089	095	101	107	114	120	7 1 0.7 2 1.4 3 2.1 4 2.8 5 3.5 6 4.2 7 4.9 8 5.6 9 6.3
710	126	132	138	144	150	156	163	169	175	181	
711	187	193	199	205	211	217	224	230	236	242	
712	248	254	260	266	272	278	285	291	297	303	
713	309	315	321	327	333	339	345	352	358	364	
714	370	376	382	388	394	400	406	412	418	425	
715	431	437	443	449	455	461	467	473	479	485	
716	491	497	503	509	516	522	528	534	540	546	
717	552	558	564	570	576	582	588	594	600	606	
718	612	618	625	631	637	643	649	655	661	667	
719	673	679	685	691	697	703	709	715	721	727	
720	733	739	745	751	757	763	769	775	781	788	
721	794	800	806	812	818	824	830	836	842	848	
722	854	860	866	872	878	884	890	896	902	908	
723	914	920	926	932	938	944	950	956	962	968	
724	974	980	986	992	998	*004	*010	*016	*022	*028	
725	86 034	040	046	052	058	064	070	076	082	088	
726	094	100	106	112	118	124	130	136	141	147	
727	153	159	165	171	177	183	189	195	201	207	
728	213	219	225	231	237	243	249	255	261	267	
729	273	279	285	291	297	303	308	314	320	326	6 1 0.6 2 1.2 3 1.8 4 2.4 5 3.0 6 3.6 7 4.2 8 4.8 9 5.4
730	332	338	344	350	356	362	368	374	380	386	
731	392	398	404	410	415	421	427	433	439	445	
732	451	457	463	469	475	481	487	493	499	504	
733	510	516	522	528	534	540	546	552	558	564	
734	570	576	581	587	593	599	605	611	617	623	
735	629	635	641	646	652	658	664	670	676	682	
736	688	694	700	705	711	717	723	729	735	741	
737	747	753	759	764	770	776	782	788	794	800	5 1 0.5 2 1.0 3 1.5 4 2.0 5 2.5 6 3.0 7 3.5 8 4.0 9 4.5
738	806	812	817	823	829	835	841	847	853	859	
739	864	870	876	882	888	894	900	906	911	917	
740	923	929	935	941	947	953	958	964	970	976	
741	982	988	994	999	*005	*011	*017	*023	*029	*035	
742	87 040	046	052	058	064	070	075	081	087	093	
743	099	105	111	116	122	128	134	140	146	151	
744	157	163	169	175	181	186	192	198	204	210	
745	216	221	227	233	239	245	251	256	262	268	
746	274	280	286	291	297	303	309	315	320	326	
747	332	338	344	349	355	361	367	373	379	384	
748	390	396	402	408	413	419	425	431	437	442	
749	448	454	460	466	471	477	483	489	495	500	
750	506	512	518	523	529	535	541	547	552	558	

N	L 0	1	2	3	4	5	6	7	8	9	P P

6960″ = 1° 56′ S 4.68 549 T 4.68 574 | 7260″ = 2° 1′ S 4.68 549 T 4.68 575
7020 = 1 57 4.68 549 4.68 574 | 7320 = 2 2 4.68 548 4.68 576
7080 = 1 58 4.68 549 4.68 575 | 7380 = 2 3 4.68 548 4.68 576
7140 = 1 59 4.68 549 4.68 575 | 7440 = 2 4 4.68 548 4.68 576
7200 = 2 0 4.68 549 4.68 575 | 7500 = 2 5 4.68 548 4.68 577

750—800

N	L 0	1	2	3	4	5	6	7	8	9	P P
750	87 506	512	518	523	529	535	541	547	552	558	
751	564	570	576	581	587	593	599	604	610	616	
752	622	628	633	639	645	651	656	662	668	674	
753	679	685	691	697	703	708	714	720	726	731	
754	737	743	749	754	760	766	772	777	783	789	
755	795	800	806	812	818	823	829	835	841	846	
756	853	858	864	869	875	881	887	892	898	904	
757	910	915	921	927	933	938	944	950	955	961	
758	967	973	978	984	990	996	*001	*007	*013	*018	
759	88 024	030	036	041	047	053	058	064	070	076	
760	081	087	093	098	104	110	116	121	127	133	
761	138	144	150	156	161	167	173	178	184	190	
762	195	201	207	213	218	224	230	235	241	247	
763	252	258	264	270	275	281	287	292	298	304	6
764	309	315	321	326	332	338	343	349	355	360	1 0.6
765	366	372	377	383	389	395	400	406	412	417	2 1.2
766	423	429	434	440	446	451	457	463	468	474	3 1.8
767	480	485	491	497	502	508	513	519	525	530	4 2.4
768	536	542	547	553	559	564	570	576	581	587	5 3.0
769	593	598	604	610	615	621	627	632	638	643	6 3.6
770	649	655	660	666	672	677	683	689	694	700	7 4.2
771	705	711	717	722	728	734	739	745	750	756	8 4.8
772	762	767	773	779	784	790	795	801	807	812	9 5.4
773	818	824	829	835	840	846	852	857	863	868	
774	874	880	885	891	897	902	908	913	919	925	
775	930	936	941	947	953	958	964	969	975	981	
776	986	992	997	*003	*009	*014	*020	*025	*031	*037	
777	89 042	048	053	059	064	070	076	081	087	092	
778	098	104	109	115	120	126	131	137	143	148	
779	154	159	165	170	176	182	187	193	198	204	
780	209	215	221	226	232	237	243	248	254	260	5
781	265	271	276	282	287	293	298	304	310	315	1 0.5
782	321	326	332	337	343	348	354	360	365	371	2 1.0
783	376	382	387	393	398	404	409	415	421	426	3 1.5
784	432	437	443	448	454	459	465	470	476	481	4 2.0
785	487	492	498	504	509	515	520	526	531	537	5 2.5
786	542	548	553	559	564	570	575	581	586	592	6 3.0
787	597	603	609	614	620	625	631	636	642	647	7 3.5
788	653	658	664	669	675	680	686	691	697	702	8 4.0
789	708	713	719	724	730	735	741	746	752	757	9 4.5
790	763	768	774	779	785	790	796	801	807	812	
791	818	823	829	834	840	845	851	856	862	867	
792	873	878	883	889	894	900	905	911	916	922	
793	927	933	938	944	949	955	960	966	971	977	
794	982	988	993	998	*004	*009	*015	*020	*026	*031	
795	90 037	042	048	053	059	064	069	075	080	086	
796	091	097	102	108	113	119	124	129	135	140	
797	146	151	157	162	168	173	179	184	189	195	
798	200	206	211	217	222	227	233	238	244	249	
799	255	260	266	271	276	282	287	293	298	304	
800	309	314	320	325	331	336	342	347	352	358	

N	L 0	1	2	3	4	5	6	7	8	9	P P

7500″ = 2° 5′	S	4.68 548	T	4.68 577	7800″ = 2° 10′	S	4.68 547	T	4.68 578
7560 = 2 6		4.68 548		4.68 577	7860 = 2 11		4.68 547		4.68 579
7620 = 2 7		4.68 548		4.68 577	7920 = 2 12		4.68 547		4.68 579
7680 = 2 8		4.68 547		4.68 578	7980 = 2 13		4.68 547		4.68 579
7740 = 2 9		4.68 547		4.68 578	8040 = 2 14		4.68 546		4.68 579

N	L 0	1	2	3	4	5	6	7	8	9	P P
800	90 309	314	320	325	331	336	342	347	352	358	
801	363	369	374	380	385	390	396	401	407	412	
802	417	423	428	434	439	445	450	455	461	466	
803	472	477	482	488	493	499	504	509	515	520	
804	526	531	536	542	547	553	558	563	569	574	
805	580	585	590	596	601	607	612	617	623	628	
806	634	639	644	650	655	660	666	671	677	682	
807	687	693	698	703	709	714	720	725	730	736	
808	741	747	752	757	763	768	773	779	784	789	
809	795	800	806	811	816	822	827	832	838	843	
810	849	854	859	865	870	875	881	886	891	897	
811	902	907	913	918	924	929	934	940	945	950	
812	956	961	966	972	977	982	988	993	998	*004	
813	91 009	014	020	025	030	036	041	046	052	057	6
814	062	068	073	078	084	089	094	100	105	110	1 0.6
815	116	121	126	132	137	142	148	153	158	164	2 1.2
816	169	174	180	185	190	196	201	206	212	217	3 1.8
817	222	228	233	238	243	249	254	259	265	270	4 2.4
818	275	281	286	291	297	302	307	312	318	323	5 3.0
819	328	334	339	344	350	355	360	365	371	376	6 3.6
820	381	387	392	397	403	408	413	418	424	429	7 4.2
821	434	440	445	450	455	461	466	471	477	482	8 4.8
822	487	492	498	503	508	514	519	524	529	535	9 5.4
823	540	545	551	556	561	566	572	577	582	587	
824	593	598	603	609	614	619	624	630	635	640	
825	645	651	656	661	666	672	677	682	687	693	
826	698	703	709	714	719	724	730	735	740	745	
827	751	756	761	766	772	777	782	787	793	798	
828	803	808	814	819	824	829	834	840	845	850	
829	855	861	866	871	876	882	887	892	897	903	
830	908	913	918	924	929	934	939	944	950	955	
831	960	965	971	976	981	986	991	997	*002	*007	
832	92 012	018	023	028	033	038	044	049	054	059	5
833	065	070	075	080	085	091	096	101	106	111	1 0.5
834	117	122	127	132	137	143	148	153	158	163	2 1.0
835	169	174	179	184	189	195	200	205	210	215	3 1.5
836	221	226	231	236	241	247	252	257	262	267	4 2.0
837	273	278	283	288	293	298	304	309	314	319	5 2.5
838	324	330	335	340	345	350	355	361	366	371	6 3.0
839	376	381	387	392	397	402	407	412	418	423	7 3.5
840	428	433	438	443	449	454	459	464	469	474	8 4.0
841	480	485	490	495	500	505	511	516	521	526	9 4.5
842	531	536	542	547	552	557	562	567	572	578	
843	583	588	593	598	603	609	614	619	624	629	
844	634	639	645	650	655	660	665	670	675	681	
845	686	691	696	701	706	711	716	722	727	732	
846	737	742	747	752	758	763	768	773	778	783	
847	788	793	799	804	809	814	819	824	829	834	
848	840	845	850	855	860	865	870	875	881	886	
849	891	896	901	906	911	916	921	927	932	937	
850	942	947	952	957	962	967	973	978	983	988	
N	L 0	1	2	3	4	5	6	7	8	9	P P

7980'	=2° 13'	S	4.68 547	T	4.68 579	8280'	=2° 18'	S	4.68 546	T	4.68 581
8040	=2 14		4.68 546		4.68 579	8340	=2 19		4.68 546		4.68 581
8100	=2 15		4.68 546		4.68 580	8400	=2 20		4.68 545		4.68 582
8160	=2 16		4.68 546		4.68 580	8460	=2 21		4.68 545		4.68 582
8220	=2 17		4.68 546		4.68 580	8520	=2 22		4.68 545		4.68 582

850—900

N	L 0	1	2	3	4	5	6	7	8	9	P P
850	92 942	947	952	957	962	967	973	978	983	988	
851	993	998	*003	*008	*013	*018	*024	*029	*034	*039	
852	93 044	049	054	059	064	069	075	080	085	090	
853	095	100	105	110	115	120	125	131	136	141	
854	146	151	156	161	166	171	176	181	186	192	
855	197	202	207	212	217	222	227	232	237	242	
856	247	252	258	263	268	273	278	283	288	293	
857	298	303	308	313	318	323	328	334	339	344	6
858	349	354	359	364	369	374	379	384	389	394	1 0.6
859	399	404	409	414	420	425	430	435	440	445	2 1.2
860	450	455	460	465	470	475	480	485	490	495	3 1.8
861	500	505	510	515	520	526	531	536	541	546	4 2.4
862	551	556	561	566	571	576	581	586	591	596	5 3.0
863	601	606	611	616	621	626	631	636	641	646	6 3.6
864	651	656	661	666	671	676	682	687	692	697	7 4.2
865	702	707	712	717	722	727	732	737	742	747	8 4.8
866	752	757	762	767	772	777	782	787	792	797	9 5.4
867	802	807	812	817	822	827	832	837	842	847	
868	852	857	862	867	872	877	882	887	892	897	
869	902	907	912	917	922	927	932	937	942	947	
870	952	957	962	967	972	977	982	987	992	997	
871	94 002	007	012	017	022	027	032	037	042	047	5
872	052	057	062	067	072	077	082	086	091	096	1 0.5
873	101	106	111	116	121	126	131	136	141	146	2 1.0
874	151	156	161	166	171	176	181	186	191	196	3 1.5
875	201	206	211	216	221	226	231	236	240	245	4 2.0
876	250	255	260	265	270	275	280	285	290	295	5 2.5
877	300	305	310	315	320	325	330	335	340	345	6 3.0
878	349	354	359	364	369	374	379	384	389	394	7 3.5
879	399	404	409	414	419	424	429	433	438	443	8 4.0
880	448	453	458	463	468	473	478	483	488	493	9 4.5
881	498	503	507	512	517	522	527	532	537	542	
882	547	552	557	562	567	571	576	581	586	591	
883	596	601	606	611	616	621	626	630	635	640	
884	645	650	655	660	665	670	675	680	685	689	
885	694	699	704	709	714	719	724	729	734	738	
886	743	748	753	758	763	768	773	778	783	787	
887	792	797	802	807	812	817	822	827	832	836	4
888	841	846	851	856	861	866	871	876	880	885	1 0.4
889	890	895	900	905	910	915	919	924	929	934	2 0.8
890	939	944	949	954	959	963	968	973	978	983	3 1.2
891	988	993	998	*002	*007	*012	*017	*022	*027	*032	4 1.6
892	95 036	041	046	051	056	061	066	071	075	080	5 2.0
893	085	090	095	100	105	109	114	119	124	129	6 2.4
894	134	139	143	148	153	158	163	168	173	177	7 2.8
895	182	187	192	197	202	207	211	216	221	226	8 3.2
896	231	236	240	245	250	255	260	265	270	274	9 3.6
897	279	284	289	294	299	303	308	313	318	323	
898	328	332	337	342	347	352	357	361	366	371	
899	376	381	386	390	395	400	405	410	415	419	
900	424	429	434	439	444	448	453	458	463	468	

N	L 0	1	2	3	4	5	6	7	8	9	P P

8460″	= 2° 21′	S	4.68 545	T	4.68 582	8760″	= 2° 26′	S	4.68 544	T	4.68 584
8520	= 2 22		4.68 545		4.68 582	8820	= 2 27		4.68 544		4.68 584
8580	= 2 23		4.68 545		4.68 583	8880	= 2 28		4.68 544		4.68 584
8640	= 2 24		4.68 545		4.68 583	8940	= 2 29		4.68 544		4.68 585
8700	= 2 25		4.68 545		4.68 583	9000	= 2 30		4.68 544		4.68 585

N	L 0	1	2	3	4	5	6	7	8	9	P P
900	95 424	429	434	439	444	448	453	458	463	468	
901	472	477	482	487	492	497	501	506	511	516	
902	521	525	530	535	540	545	550	554	559	564	
903	569	574	578	583	588	593	598	602	607	612	
904	617	622	626	631	636	641	646	650	655	660	
905	665	670	674	679	684	689	694	698	703	708	
906	713	718	722	727	732	737	742	746	751	756	
907	761	766	770	775	780	785	789	794	799	804	
908	809	813	818	823	828	832	837	842	847	852	
909	856	861	866	871	875	880	885	890	895	899	
910	904	909	914	918	923	928	933	938	942	947	
911	952	957	961	966	971	976	980	985	990	995	
912	999	*004	*009	*014	*019	*023	*028	*033	*038	*042	
913	96 047	052	057	061	066	071	076	080	085	090	
914	095	099	104	109	114	118	123	128	133	137	
915	142	147	152	156	161	166	171	175	180	185	
916	190	194	199	204	209	213	218	223	227	232	
917	237	242	246	251	256	261	265	270	275	280	
918	284	289	294	298	303	308	313	317	322	327	
919	332	336	341	346	350	355	360	365	369	374	
920	379	384	388	393	398	402	407	412	417	421	
921	426	431	435	440	445	450	454	459	464	468	
922	473	478	483	487	492	497	501	506	511	515	
923	520	525	530	534	539	544	548	553	558	562	
924	567	572	577	581	586	591	595	600	605	609	
925	614	619	624	628	633	638	642	647	652	656	
926	661	666	670	675	680	685	689	694	699	703	
927	708	713	717	722	727	731	736	741	745	750	
928	755	759	764	769	774	778	783	788	792	797	
929	802	806	811	816	820	825	830	834	839	844	
930	848	853	858	862	867	872	876	881	886	890	
931	895	900	904	909	914	918	923	928	932	937	
932	942	946	951	956	960	965	970	974	979	984	
933	988	993	997	*002	*007	*011	*016	*021	*025	*030	
934	97 035	039	044	049	053	058	063	067	072	077	
935	081	086	090	095	100	104	109	114	118	123	
936	128	132	137	142	146	151	155	160	165	169	
937	174	179	183	188	192	197	202	206	211	216	
938	220	225	230	234	239	243	248	253	257	262	
939	267	271	276	280	285	290	294	299	304	308	
940	313	317	322	327	331	336	340	345	350	354	
941	359	364	368	373	377	382	387	391	396	400	
942	405	410	414	419	424	428	433	437	442	447	
943	451	456	460	465	470	474	479	483	488	493	
944	497	502	506	511	516	520	525	529	534	539	
945	543	548	552	557	562	566	571	575	580	585	
946	589	594	598	603	607	612	617	621	626	630	
947	635	640	644	649	653	658	663	667	672	676	
948	681	685	690	695	699	704	708	713	717	722	
949	727	731	736	740	745	749	754	759	763	768	
950	772	777	782	786	791	795	800	804	809	813	
N	L 0	1	2	3	4	5	6	7	8	9	P P

9000″	=2° 30′	S	4.68 544	T	4.68 585	9300″	=2° 35′	S	4.68 543	T	4.68 587
9060	=2 31		4.68 544		4.68 585	9360	=2 36		4.68 543		4.68 587
9120	=2 32		4.68 543		4.68 586	9420	=2 37		4.68 542		4.68 588
9180	=2 33		4.68 543		4.68 586	9480	=2 38		4.68 542		4.68 588
9240	=2 34		4.68 543		4.68 587	9540	=2 39		4.68 542		4.68 588

5	
1	0.5
2	1.0
3	1.5
4	2.0
5	2.5
6	3.0
7	3.5
8	4.0
9	4.5

4	
1	0.4
2	0.8
3	1.2
4	1.6
5	2.0
6	2.4
7	2.8
8	3.2
9	3.6

N	L 0	1	2	3	4	5	6	7	8	9	P P
950	97 772	777	782	786	791	795	800	804	809	813	
951	818	823	827	832	836	841	845	850	855	859	
952	864	868	873	877	882	886	891	896	900	905	
953	909	914	918	923	928	932	937	941	946	950	
954	955	959	964	968	973	978	982	987	991	996	
955	98 000	005	009	014	019	023	028	032	037	041	
956	046	050	055	059	064	068	073	078	082	087	
957	091	096	100	105	109	114	118	123	127	132	
958	137	141	146	150	155	159	164	168	173	177	
959	182	186	191	195	200	204	209	214	218	223	
960	227	232	236	241	245	250	254	259	263	268	
961	272	277	281	286	290	295	299	304	308	313	5
962	318	322	327	331	336	340	345	349	354	358	1 | 0.5
963	363	367	372	376	381	385	390	394	399	403	2 | 1.0
964	408	412	417	421	426	430	435	439	444	448	3 | 1.5
965	453	457	462	466	471	475	480	484	489	493	4 | 2.0
966	498	502	507	511	516	520	525	529	534	538	5 | 2.5
967	543	547	552	556	561	565	570	574	579	583	6 | 3.0
968	588	592	597	601	605	610	614	619	623	628	7 | 3.5
969	632	637	641	646	650	655	659	664	668	673	8 | 4.0
970	677	682	686	691	695	700	704	709	713	717	9 | 4.5
971	722	726	731	735	740	744	749	753	758	762	
972	767	771	776	780	784	789	793	798	802	807	
973	811	816	820	825	829	834	838	843	847	851	
974	856	860	865	869	874	878	883	887	892	896	
975	900	905	909	914	918	923	927	932	936	941	
976	945	949	954	958	963	967	972	976	981	985	
977	989	994	998	*003	*007	*012	*016	*021	*025	*029	
978	99 034	038	043	047	052	056	061	065	069	074	
979	078	083	087	092	096	100	105	109	114	118	
980	123	127	131	136	140	145	149	154	158	162	
981	167	171	176	180	185	189	193	198	202	207	
982	211	216	220	224	229	233	238	242	247	251	
983	255	260	264	269	273	277	282	286	291	295	
984	300	304	308	313	317	322	326	330	335	339	4
985	344	348	352	357	361	366	370	374	379	383	1 | 0.4
986	388	392	396	401	405	410	414	419	423	427	2 | 0.8
987	432	436	441	445	449	454	458	463	467	471	3 | 1.2
988	476	480	484	489	493	498	502	506	511	515	4 | 1.6
989	520	524	528	533	537	542	546	550	555	559	5 | 2.0
990	564	568	572	577	581	585	590	594	599	603	6 | 2.4
991	607	612	616	621	625	629	634	638	642	647	7 | 2.8
992	651	656	660	664	669	673	677	682	686	691	8 | 3.2
993	695	699	704	708	712	717	721	726	730	734	9 | 3.6
994	739	743	747	752	756	760	765	769	774	778	
995	782	787	791	795	800	804	808	813	817	822	
996	826	830	835	839	843	848	852	856	861	865	
997	870	874	878	883	887	891	896	900	904	909	
998	913	917	922	926	930	935	939	944	948	952	
999	957	961	965	970	974	978	983	987	991	996	
1000	00 000	004	009	013	017	022	026	030	035	039	

N	L 0	1	2	3	4	5	6	7	8	9	P P

9480″ =2° 38′ S 4.68 542 T 4.68 588 | 9780″ =2° 43′ S 4.68 541 T 4.68 590
9540 =2 39 4.68 542 4.68 588 | 9840 =2 44 4.68 541 4.68 590
9600 =2 40 4.68 542 4.68 589 | 9900 =2 45 4.68 541 4.68 591
9660 =2 41 4.68 542 4.68 589 | 9960 =2 46 4.68 541 4.68 591
9720 =2 42 4.68 541 4.68 590 | 10020 =2 47 4.68 540 4.68 592

THE NATURAL LOGARITHMS
OF
WHOLE NUMBERS FROM 1 TO 200

Common logarithms may be converted into natural logarithms by multiplying them by 2.3025850930.

Natural logarithms may be converted into common logarithms by multiplying them by 0.4342944819.

N	Nat Log	N	Nat Log	N	Nat Log	N	Nat Log	N	Nat Log
0	$-\infty$	40	3.68 888	80	4.38 203	120	4.78 749	160	5.07 517
1	0.00 000	41	3.71 357	81	4.39 445	121	4.79 579	161	5.08 140
2	0.69 315	42	3.73 767	82	4.40 672	122	4.80 402	162	5.08 760
3	1.09 861	43	3.76 120	83	4.41 884	123	4.81 218	163	5.09 375
4	1.38 629	44	3.78 419	84	4.43 082	124	4.82 028	164	5.09 987
5	1.60 944	45	3.80 666	85	4.44 265	125	4.82 831	165	5.10 595
6	1.79 176	46	3.82 864	86	4.45 435	126	4.83 628	166	5.11 199
7	1.94 591	47	3.85 015	87	4.46 591	127	4.84 419	167	5.11 799
8	2.07 944	48	3.87 120	88	4.47 734	128	4.85 203	168	5.12 396
9	2.19 722	49	3.89 182	89	4.48 864	129	4.85 981	169	5.12 990
10	2.30 259	50	3.91 202	90	4.49 981	130	4.86 753	170	5.13 580
11	2.39 790	51	3.93 183	91	4.51 086	131	4.87 520	171	5.14 166
12	2.48 491	52	3.95 124	92	4.52 179	132	4.88 280	172	5.14 749
13	2.56 495	53	3.97 029	93	4.53 260	133	4.89 035	173	5.15 329
14	2.63 906	54	3.98 898	94	4.54 329	134	4.89 784	174	5.15 906
15	2.70 805	55	4.00 733	95	4.55 388	135	4.90 527	175	5.16 479
16	2.77 259	56	4.02 535	96	4.56 435	136	4.91 265	176	5.17 048
17	2.83 321	57	4.04 305	97	4.57 471	137	4.91 998	177	5.17 615
18	2.89 037	58	4.06 044	98	4.58 497	138	4.92 725	178	5.18 178
19	2.94 444	59	4.07 754	99	4.59 512	139	4.93 447	179	5.18 739
20	2.99 573	60	4.09 434	100	4.60 517	140	4.94 164	180	5.19 296
21	3.04 452	61	4.11 087	101	4.61 512	141	4.94 876	181	5.19 850
22	3.09 104	62	4.12 713	102	4.62 497	142	4.95 583	182	5.20 401
23	3.13 549	63	4.14 313	103	4.63 473	143	4.96 284	183	5.20 949
24	3.17 805	64	4.15 888	104	4.64 439	144	4.96 981	184	5.21 494
25	3.21 888	65	4.17 439	105	4.65 396	145	4.97 673	185	5.22 036
26	3.25 810	66	4.18 965	106	4.66 344	146	4.98 361	186	5.22 575
27	3.29 584	67	4.20 469	107	4.67 283	147	4.99 043	187	5.23 111
28	3.33 220	68	4.21 951	108	4.68 213	148	4.99 721	188	5.23 644
29	3.36 730	69	4.23 411	109	4.69 135	149	5.00 395	189	5.24 175
30	3.40 120	70	4.24 850	110	4.70 048	150	5.01 064	190	5.24 702
31	3.43 399	71	4.26 268	111	4.70 953	151	5.01 728	191	5.25 227
32	3.46 574	72	4.27 667	112	4.71 850	152	5.02 388	192	5.25 750
33	3.49 651	73	4.29 046	113	4.72 739	153	5.03 044	193	5.26 269
34	3.52 636	74	4.30 407	114	4.73 620	154	5.03 695	194	5.26 786
35	3.55 535	75	4.31 749	115	4.74 493	155	5.04 343	195	5.27 300
36	3.58 352	76	4.33 073	116	4.75 359	156	5.04 986	196	5.27 811
37	3.61 092	77	4.34 381	117	4.76 217	157	5.05 625	197	5.28 320
38	3.63 759	78	4.35 671	118	4.77 068	158	5.06 260	198	5.28 827
39	3.66 356	79	4.36 945	119	4.77 912	159	5.06 890	199	5.29 330
40	3.68 888	80	4.38 203	120	4.78 749	160	5.07 517	200	5.29 832

TABLE OF THE LOGARITHMS

OF THE

TRIGONOMETRIC FUNCTIONS

FROM 0° TO 1° AND 89° TO 90° FOR EVERY SECOND,

AND

FROM 1° TO 6° AND 84° TO 89° FOR EVERY TEN SECONDS.

L Cos	°90	L Sin				0°	L Tan				180°	°270°	
0.00	′ ″	0″	1″	2″	3″	4″	5″	6″	7″	8″	9″	10″	
0000	0 0	—	68557	98660	*16270	*28763	*38454	*46373	*53067	*58866	*63982	*68557	50
000	10	5. 68557	72697	76476	79952	83170	86167	88969	91602	94085	96433	98660	40
000	20	98660	*00779	*02800	*04730	*06579	*08351	*10055	*11694	*13273	*14797	*16270	30
000	30	6. 16270	17694	19072	20409	21705	22964	24188	25378	26536	27664	28763	20
000	40	28763	29836	30882	31904	32903	33879	34833	35767	36682	37577	38454	10
000	50	38454	39315	40158	40985	41797	42594	43376	44145	44900	45643	46373	0 59
0001	0	6.4 6373	7090	7797	8492	9175	9849	*0512	*1165	*1808	*2442	*3067	50
000	10	6.5 3067	3683	4291	4890	5481	6064	6639	7207	7767	8320	8866	40
000	20	8866	9406	9939	*0465	*0985	*1499	*2007	*2509	*3006	*3496	*3982	30
000	30	6.6 3982	4462	4936	5406	5870	6330	6785	7235	7680	8121	8557	20
000	40	8557	8990	9418	9841	*0261	*0676	*1088	*1496	*1900	*2300	*2697	10
000	50	6.7 2697	3090	3479	3865	4248	4627	5003	5376	5746	6112	6476	0 58
0002	0		6476	6836	7193	7548	7900	8248	8595	8938	9278	9616	9952	50
000	10		9952	*0285	*0615	*0943	*1268	*1591	*1911	*2230	*2545	*2859	*3170	40
000	20	6.8 3170	3479	3786	4091	4394	4694	4993	5289	5584	5876	6167	30
000	30		6167	6455	6742	7027	7310	7591	7870	8147	8423	8697	8969	20
000	40		8969	9240	9509	9776	*0042	*0306	*0568	*0829	*1088	*1346	*1602	10
000	50	6.9 1602	1857	2110	2362	2612	2861	3109	3355	3599	3843	4085	0 57
0003	0		4085	4325	4565	4803	5039	5275	5509	5742	5973	6204	6433	50
000	10		6433	6661	6888	7113	7338	7561	7783	8004	8224	8443	8660	40
000	20		8660	8877	9093	9307	9520	9733	9944	*0155	*0364	*0572	*0779	30
000	30	7.0 0779	0986	1191	1395	1599	1801	2003	2203	2403	2602	2800	20
000	40		2800	2997	3193	3388	3582	3776	3968	4160	4351	4541	4730	10
000	50		4730	4919	5106	5293	5479	5664	5849	6032	6215	6397	6579	0 56
0004	0		6579	6759	6939	7118	7296	7474	7651	7827	8003	8177	8351	50
000	10		8351	8525	8698	8870	9041	9211	9381	9551	9719	9887	*0055	40
000	20	7.1 0055	0222	0388	0553	0718	0882	1046	1209	1371	1533	1694	30
000	30		1694	1854	2014	2174	2333	2491	2648	2805	2962	3118	3273	20
000	40		3273	3428	3582	3736	3889	4042	4194	4346	4497	4647	4797	10
000	50		4797	4947	5096	5244	5392	5540	5687	5833	5979	6125	6270	0 55
0.00		10″	9″	8″	7″	6″	5″	4″	3″	2″	1″	0″	′ ″	
L Sin		L Cos				89°	L Cot				°179°	269°	°359°	

	144	143	142	141	140	139		138	137	136	135	134	133	
1	14.4	14.3	14.2	14.1	14.0	13.9	1	13.8	13.7	13.6	13.5	13.4	13.3	1
2	28.8	28.6	28.4	28.2	28.0	27.8	2	27.6	27.4	27.2	27.0	26.8	26.6	2
3	43.2	42.9	42.6	42.3	42.0	41.7	3	41.4	41.1	40.8	40.5	40.2	39.9	3
4	57.6	57.2	56.8	56.4	56.0	55.6	4	55.2	54.8	54.4	54.0	53.6	53.2	4
5	72.0	71.5	71.0	70.5	70.0	69.5	5	69.0	68.5	68.0	67.5	67.0	66.5	5
6	86.4	85.8	85.2	84.6	84.0	83.4	6	82.8	82.2	81.6	81.0	80.4	79.8	6
7	100.8	100.1	99.4	98.7	98.0	97.3	7	96.6	95.9	95.2	94.5	93.8	93.1	7
8	115.2	114.4	113.6	112.8	112.0	111.2	8	110.4	109.6	108.8	108.0	107.2	106.4	8
9	129.6	128.7	127.8	126.9	126.0	125.1	9	124.2	123.3	122.4	121.5	120.6	119.7	9

	132	131	130	129	128	127		126	125	124	123	122	121	
1	13.2	13.1	13.0	12.9	12.8	12.7	1	12.6	12.5	12.4	12.3	12.2	12.1	1
2	26.4	26.2	26.0	25.8	25.6	25.4	2	25.2	25.0	24.8	24.6	24.4	24.2	2
3	39.6	39.3	39.0	38.7	38.4	38.1	3	37.8	37.5	37.2	36.9	36.6	36.3	3
4	52.8	52.4	52.0	51.6	51.2	50.8	4	50.4	50.0	49.6	49.2	48.8	48.4	4
5	66.0	65.5	65.0	64.5	64.0	63.5	5	63.0	62.5	62.0	61.5	61.0	60.5	5
6	79.2	78.6	78.0	77.4	76.8	76.2	6	75.6	75.0	74.4	73.8	73.2	72.6	6
7	92.4	91.7	91.0	90.3	89.6	88.9	7	88.2	87.5	86.8	86.1	85.4	84.7	7
8	105.6	104.8	104.0	103.2	102.4	101.6	8	100.8	100.0	99.2	98.4	97.6	96.8	8
9	118.8	117.9	117.0	116.1	115.2	114.3	9	113.4	112.5	111.6	110.7	109.8	108.9	9

	120	119	118	117	116	115		114	113	112	111	110	109	
1	12.0	11.9	11.8	11.7	11.6	11.5	1	11.4	11.3	11.2	11.1	11.0	10.9	1
2	24.0	23.8	23.6	23.4	23.2	23.0	2	22.8	22.6	22.4	22.2	22.0	21.8	2
3	36.0	35.7	35.4	35.1	34.8	34.5	3	34.2	33.9	33.6	33.3	33.0	32.7	3
4	48.0	47.6	47.2	46.8	46.4	46.0	4	45.6	45.2	44.8	44.4	44.0	43.6	4
5	60.0	59.5	59.0	58.5	58.0	57.5	5	57.0	56.5	56.0	55.5	55.0	54.5	5
6	72.0	71.4	70.8	70.2	69.6	69.0	6	68.4	67.8	67.2	66.6	66.0	65.4	6
7	84.0	83.3	82.6	81.9	81.2	80.5	7	79.8	79.1	78.4	77.7	77.0	76.3	7
8	96.0	95.2	94.4	93.6	92.8	92.0	8	91.2	90.4	89.6	88.8	88.0	87.2	8
9	108.0	107.1	106.2	105.3	104.4	103.5	9	102.6	101.7	100.8	99.9	99.0	98.1	9

0.00	′	″	0′	1′	2′	3′	4′	5′	6′	7′	8′	9′	10′		
000	5	0	7.1 6270	6414	6558	6702	6845	6987	7130	7271	7413	7553	7694	50	
000		10	7694	7834	7973	8112	8250	8389	8526	8663	8800	8937	9072	40	
000		20	9072	9208	9343	9478	9612	9746	9879	*0012	*0145	*0277	*0409	30	
000		30	7.2 0409	0540	0671	0802	0932	1062	1191	1320	1449	1577	1705	20	
000		40	1705	1833	1960	2087	2213	2339	2465	2590	2715	2840	2964	10	
000		50	2964	3088	3212	3335	3458	3580	3702	3824	3946	4067	4188	0	54
000	6	0	4188	4308	4428	4548	4668	4787	4906	5024	5142	5260	5378	50	
000		10	5378	5495	5612	5728	5845	5961	6076	6192	6307	6421	6536	40	
000		20	6536	6650	6764	6877	6991	7104	7216	7329	7441	7552	7664	30	
000		30	7664	7775	7886	7997	8107	8217	8327	8437	8546	8655	8763	20	
000		40	8763	8872	8980	9088	9196	9303	9410	9517	9623	9730	9836	10	
000		50	9836	9942	*0047	*0152	*0257	*0362	*0467	*0571	*0675	*0779	*0882	0	53
000	7	0	7.3 0882	0986	1089	1191	1294	1396	1498	1600	1702	1803	1904	50	
000		10	1904	2005	2106	2206	2306	2406	2506	2606	2705	2804	2903	40	
000		20	2903	3001	3100	3198	3296	3393	3491	3588	3685	3782	3879	30	
000		30	3879	3975	4071	4167	4263	4359	4454	4549	4644	4739	4833	20	
000		40	4833	4928	5022	5116	5209	5303	5396	5489	5582	5675	5767	10	
000		50	5767	5860	5952	6044	6135	6227	6318	6409	6500	6591	6682	0	52
000	8	0	6682	6772	6862	6952	7042	7132	7221	7310	7399	7488	7577	50	
000		10	7577	7666	7754	7842	7930	8018	8106	8193	8280	8367	8454	40	
000		20	8454	8541	8628	8714	8800	8887	8972	9058	9144	9229	9314	30	
000		30	9314	9400	9484	9569	9654	9738	9822	9906	9990	*0074	*0158	20	
000		40	7.4 0158	0241	0324	0408	0491	0573	0656	0739	0821	0903	0985	10	
000		50	0985	1067	1149	1230	1312	1393	1474	1555	1636	1716	1797	0	51
000	9	0	1797	1877	1957	2037	2117	2197	2277	2356	2435	2515	2594	50	
000		10	2594	2673	2751	2830	2908	2987	3065	3143	3221	3299	3376	40	
000		20	3376	3454	3531	3608	3685	3762	3839	3916	3992	4069	4145	30	
000		30	4145	4221	4297	4373	4449	4524	4600	4675	4750	4825	4900	20	
000		40	4900	4975	5050	5124	5199	5273	5347	5421	5495	5569	5643	10	
000		50	5643	5716	5790	5863	5936	6009	6082	6155	6228	6300	6373	0	50
0.00			10′	9′	8′	7′	6′	5′	4′	3′	2′	1′	0′	′	″

	108	107	106	105	104	103		102	101	99	98	97	96	
1	10.8	10.7	10.6	10.5	10.4	10.3	1	10.2	10.1	9.9	9.8	9.7	9.6	1
2	21.6	21.4	21.2	21.0	20.8	20.6	2	20.4	20.2	19.8	19.6	19.4	19.2	2
3	32.4	32.1	31.8	31.5	31.2	30.9	3	30.6	30.3	29.7	29.4	29.1	28.8	3
4	43.2	42.8	42.4	42.0	41.6	41.2	4	40.8	40.4	39.6	39.2	38.8	38.4	4
5	54.0	53.5	53.0	52.5	52.0	51.5	5	51.0	50.5	49.5	49.0	48.5	48.0	5
6	64.8	64.2	63.6	63.0	62.4	61.8	6	61.2	60.6	59.4	58.8	58.2	57.6	6
7	75.6	74.9	74.2	73.5	72.8	72.1	7	71.4	70.7	69.3	68.6	67.9	67.2	7
8	86.4	85.6	84.8	84.0	83.2	82.4	8	81.6	80.8	79.2	78.4	77.6	76.8	8
9	97.2	96.3	95.4	94.5	93.6	92.7	9	91.8	90.9	89.1	88.2	87.3	86.4	9

	95	94	93	92	91	90		89	88	87	86	85	84	
1	9.5	9.4	9.3	9.2	9.1	9.0	1	8.9	8.8	8.7	8.6	8.5	8.4	1
2	19.0	18.8	18.6	18.4	18.2	18.0	2	17.8	17.6	17.4	17.2	17.0	16.8	2
3	28.5	28.2	27.9	27.6	27.3	27.0	3	26.7	26.4	26.1	25.8	25.5	25.2	3
4	38.0	37.6	37.2	36.8	36.4	36.0	4	35.6	35.2	34.8	34.4	34.0	33.6	4
5	47.5	47.0	46.5	46.0	45.5	45.0	5	44.5	44.0	43.5	43.0	42.5	42.0	5
6	57.0	56.4	55.8	55.2	54.6	54.0	6	53.4	52.8	52.2	51.6	51.0	50.4	6
7	66.5	65.8	65.1	64.4	63.7	63.0	7	62.3	61.6	60.9	60.2	59.5	58.8	7
8	76.0	75.2	74.4	73.6	72.8	72.0	8	71.2	70.4	69.6	68.8	68.0	67.2	8
9	85.5	84.6	83.7	82.8	81.9	81.0	9	80.1	79.2	78.3	77.4	76.5	75.6	9

	83	82	81	80	79	78		77	76	75	74	73	72	
1	8.3	8.2	8.1	8.0	7.9	7.8	1	7.7	7.6	7.5	7.4	7.3	7.2	1
2	16.6	16.4	16.2	16.0	15.8	15.6	2	15.4	15.2	15.0	14.8	14.6	14.4	2
3	24.9	24.6	24.3	24.0	23.7	23.4	3	23.1	22.8	22.5	22.2	21.9	21.6	3
4	33.2	32.8	32.4	32.0	31.6	31.2	4	30.8	30.4	30.0	29.6	29.2	28.8	4
5	41.5	41.0	40.5	40.0	39.5	39.0	5	38.5	38.0	37.5	37.0	36.5	36.0	5
6	49.8	49.2	48.6	48.0	47.4	46.8	6	46.2	45.6	45.0	44.4	43.8	43.2	6
7	58.1	57.4	56.7	56.0	55.3	54.6	7	53.9	53.2	52.5	51.8	51.1	50.4	7
8	66.4	65.6	64.8	64.0	63.2	62.4	8	61.6	60.8	60.0	59.2	58.4	57.6	8
9	74.7	73.8	72.9	72.0	71.1	70.2	9	69.3	68.4	67.5	66.6	65.7	64.8	9

′	″	0″	1″	2″	3″	4″	5″	6″	7″	8″	9″	10″		
5	0	7.1 6270	6414	6558	6702	6845	6988	7130	7271	7413	7553	7694	50	
	10	7694	7834	7973	8112	8250	8389	8526	8663	8800	8937	9073	40	
	20	9073	9208	9343	9478	9612	9746	9879	*0012	*0145	*0277	*0409	30	
	30	7.2 0409	0540	0671	0802	0932	1062	1191	1321	1449	1577	1705	20	
	40	1705	1833	1960	2087	2213	2339	2465	2590	2715	2840	2964	10	
	50	2964	3088	3212	3335	3458	3580	3703	3824	3946	4067	4188	0	**54**
6	0	4188	4308	4428	4548	4668	4787	4906	5024	5142	5260	5378	50	
	10	5378	5495	5612	5728	5845	5961	6076	6192	6307	6421	6536	40	
	20	6536	6650	6764	6877	6991	7104	7216	7329	7441	7552	7664	30	
	30	7664	7775	7886	7997	8107	8217	8327	8437	8546	8655	8764	20	
	40	8764	8872	8980	9088	9196	9303	9410	9517	9624	9730	9836	10	
	50	9836	9942	*0047	*0153	*0258	*0362	*0467	*0571	*0675	*0779	*0882	0	**53**
7	0	7.3 0882	0986	1089	1192	1294	1396	1499	1600	1702	1803	1904	50	
	10	1904	2005	2106	2206	2307	2406	2506	2606	2705	2804	2903	40	
	20	2903	3001	3100	3198	3296	3394	3491	3588	3685	3782	3879	30	
	30	3879	3975	4071	4167	4263	4359	4454	4549	4644	4739	4833	20	
	40	4833	4928	5022	5116	5209	5303	5396	5489	5582	5675	5767	10	
	50	5767	5860	5952	6044	6135	6227	6318	6409	6500	6591	6682	0	**52**
8	0	6682	6772	6862	6952	7042	7132	7221	7310	7400	7488	7577	50	
	10	7577	7666	7754	7842	7930	8018	8106	8193	8281	8368	8455	40	
	20	8455	8541	8628	8714	8801	8887	8973	9058	9144	9229	9315	30	
	30	9315	9400	9485	9569	9654	9738	9823	9907	9991	*0074	*0158	20	
	40	7.4 0158	0241	0325	0408	0491	0574	0656	0739	0821	0903	0985	10	
	50	0985	1067	1149	1230	1312	1393	1474	1555	1636	1716	1797	0	**51**
9	0	1797	1877	1958	2038	2117	2197	2277	2356	2436	2515	2594	50	
	10	2594	2673	2751	2830	2909	2987	3065	3143	3221	3299	3376	40	
	20	3376	3454	3531	3608	3686	3762	3839	3916	3992	4069	4145	30	
	30	4145	4221	4297	4373	4449	4524	4600	4675	4750	4825	4900	20	
	40	4900	4975	5050	5124	5199	5273	5347	5421	5495	5569	5643	10	
	50	5643	5716	5790	5863	5936	6009	6082	6155	6228	6300	6373	0	**50**
		10″	9″	8″	7″	6″	5″	4″	3″	2″	1″	0″	′	″

Cos L Sin 0° *90° 180° *270°

	′ ″	0″	1″	2″	3″	4″	5″	6″	7″	8″	9″	10″		P P
.000	10 0	7.46 373	445	517	589	661	733	805	876	948	*019	*090	50	72
000	10	7.47 090	162	233	303	374	445	515	586	656	726	797	40	1 7.
000	20	797	867	936	*006	*076	*145	*215	*284	*353	*422	*491	30	2 14.
000	30	7.48 491	560	629	698	766	835	903	971	*039	*108	*175	20	3 21.
000	40	7.49 175	243	311	379	446	513	581	648	715	782	849	10	4 28.
000	50	849	916	982	*049	*115	*182	*248	*314	*380	*446	*512	0 49	5 35.
000	11 0	7.50 512	578	643	709	774	840	905	970	*035	*100	*165	50	6 42.
000	10	7.51 163	230	294	359	423	488	552	616	680	744	808	40	7 49.
000	20	808	872	936	999	*063	*126	*190	*253	*316	*379	*442	30	8 56.
000	30	7.52 442	505	568	631	693	756	818	881	943	*005	*067	20	9 63.
000	40	7.53 067	129	191	253	315	376	438	499	561	622	683	10	70
000	50	683	744	805	866	927	988	*049	*109	*170	*230	*291	0 48	1 7.
000	12 0	7.54 291	351	411	471	531	591	651	711	771	830	890	50	2 14.
000	10	890	949	*009	*068	*127	*186	*245	*304	*363	*422	*481	40	3 21.
000	20	7.55 481	539	598	656	715	773	831	889	948	*006	*064	30	4 28.
000	30	7.56 064	121	179	237	295	352	410	467	524	582	639	20	5 35.
000	40	639	696	753	810	867	924	980	*037	*094	*150	*206	10	6 42.
000	50	7.57 206	263	319	375	431	488	544	599	655	711	767	0 47	7 49.
000	13 0	767	822	878	934	989	*044	*100	*155	*210	*265	*320	50	8 56.
000	10	7.58 320	375	430	485	539	594	649	703	758	812	866	40	9 63.
000	20	866	921	975	*029	*083	*137	*191	*245	*299	*352	*406	30	68
000	30	7.59 406	459	513	566	620	673	726	780	833	886	939	20	1 6.
000	40	939	992	*045	*097	*150	*203	*255	*308	*360	*413	*465	10	2 13.
000	50	7.60 465	517	570	622	674	726	778	830	882	934	985	0 46	3 20.
000	14 0	985	*037	*089	*140	*192	*243	*294	*346	*397	*448	*499	50	4 27.
000	10	7.61 499	550	601	652	703	754	805	855	906	957	*007	40	5 34.
000	20	7.62 007	058	108	158	209	259	309	359	409	459	509	30	6 40.
000	30	509	559	609	659	708	758	808	857	907	956	*006	20	7 47.
000	40	7.63 006	055	104	153	203	252	301	350	399	448	496	10	8 54.
000	50	496	545	594	642	691	740	788	837	885	933	982	0 45	9 61.
000	15 0	982	*030	*078	*126	*174	*222	*270	*318	*366	*414	*461	50	64
000	10	7.64 461	509	557	604	652	699	747	794	842	889	936	40	1 6.
000	20	936	983	*030	*078	*125	*172	*218	*265	*312	*359	*406	30	2 12.
000	30	7.65 406	452	499	546	592	638	685	731	778	824	870	20	3 19.
000	40	870	916	962	*009	*055	*101	*146	*192	*238	*284	*330	10	4 25.
000	50	7.66 330	375	421	467	512	558	603	649	694	739	784	0 44	5 32.
000	16 0	784	830	875	920	965	010	*055	*100	*145	*190	*235	50	6 38.
000	10	7.67 235	279	324	369	413	458	502	547	591	636	680	40	7 44.
000	20	680	724	768	813	857	901	945	989	*033	*077	*121	30	8 51.
999	30	7.68 121	165	208	252	296	340	383	427	470	514	557	20	9 57.
999	40	557	601	644	687	731	774	817	860	903	946	989	10	62
999	50	989	*032	*075	*118	*161	*204	*247	*289	*332	*375	*417	0 43	1 6.
999	17 0	7.69 417	460	502	545	587	630	672	714	757	799	841	50	2 12.
999	10	841	883	925	967	*009	*051	*093	*135	*177	*219	*261	40	3 18.
999	20	7.70 261	302	344	386	427	469	510	552	593	635	676	30	4 25.
999	30	676	718	759	800	841	883	924	965	*006	*047	*088	20	5 31.
999	40	7.71 088	129	170	211	251	292	333	374	414	455	496	10	6 37.
999	50	496	536	577	617	658	698	739	779	819	859	900	0 42	7 43.
999	18 0	900	940	980	*020	*060	*100	*140	*180	*220	*260	*300	50	8 49.
999	10	7.72 300	340	380	419	459	499	538	578	618	657	697	40	9 55.
999	20	697	736	775	815	854	894	933	972	*011	*050	*090	30	61
999	30	7.73 090	129	168	207	246	285	324	363	401	440	479	20	1 6.
999	40	479	518	557	595	634	673	711	750	788	827	865	10	2 12.
999	50	865	904	942	980	*019	*057	*095	*133	*171	*210	*248	0 41	3 18.
999	19 0	7.74 248	286	324	362	400	438	476	514	551	589	627	50	4 24.
999	10	627	665	703	740	778	815	853	891	928	966	*003	40	5 30.
999	20	7.75 003	040	078	115	153	190	227	264	302	339	376	30	6 36.
999	30	376	413	450	487	524	561	598	635	672	709	745	20	7 42.
999	40	745	782	819	856	892	929	966	*002	*039	*075	*112	10	8 48.
999	50	7.76 112	148	185	221	258	294	330	367	403	439	475	0 40	9 54.
9.99		10″	9″	8″	7″	6″	5″	4″	3″	2″	1″	0″	′ ″	P P

L Sin *179° 269° *359 89° L Cos

L Tan 0° *90° 180° *270°

′	0′	1′	2′	3′	4′	5′	6′	7′	8′	9′	10′		P P
10 0	7.46 373	445	517	589	661	733	805	876	948	*019	*091	50	60 59 58
10	7.47 091	162	233	304	374	445	516	586	656	727	797	40	1 6.0 5.9 5.8
20	797	867	937	*006	*076	*146	*215	*284	*354	*423	*492	30	2 12.0 11.8 11.6
30	7.48 492	561	629	698	767	835	903	972	*040	*108	*176	20	3 18.0 17.7 17.4
40	7.49 176	243	311	379	446	514	581	648	715	782	849	10	4 24.0 23.6 23.2
50	849	916	982	*049	*115	*182	*248	*314	*380	*446	*512	0 49	5 30.0 29.5 28.9
													6 36.0 35.4 34.7
11 0	7.50 512	578	643	709	774	840	905	970	*035	*100	*165	50	7 42.0 41.3 40.5
10	7.51 165	230	295	359	424	488	552	617	681	745	809	40	8 48.0 47.2 46.4
20	809	872	936	*000	*063	*127	*190	*253	*316	*380	*443	30	9 54.0 53.1 52.2
30	7.52 443	505	568	631	694	756	819	881	943	*005	*067	20	55 55 54
40	7.53 067	129	191	253	315	377	438	500	561	622	683	10	1 5.5 5.5 5.4
50	683	745	806	867	927	988	*049	*110	*170	*231	*291	0 48	2 11.0 11.0 10.8
													3 16.5 16.5 16.2
12 0	7.54 291	351	411	471	532	591	651	711	771	830	890	50	4 22.0 22.0 21.6
10	890	949	*009	*068	*127	*186	*245	*304	*363	*422	*481	40	5 27.5 27.5 27.0
20	7.55 481	539	598	657	715	773	832	890	948	*006	*064	30	6 33.0 33.0 32.4
30	7.56 064	122	179	237	295	352	410	467	525	582	639	20	7 38.5 38.5 37.8
40	639	696	753	810	867	924	981	*037	*094	*150	*207	10	8 44.0 44.0 43.2
50	7.57 207	263	319	376	432	488	544	600	656	711	767	0 47	9 49.5 49.5 48.6
													53 52 51
13 0	767	823	878	934	989	*045	*100	*155	*210	*265	*320	50	1 5.3 5.2 5.1
10	7.58 320	375	430	485	540	594	649	704	758	812	867	40	2 10.6 10.4 10.2
20	867	921	975	*029	*083	*137	*191	*245	*299	*353	*406	30	3 15.9 15.6 15.3
30	7.59 406	460	513	567	620	673	727	780	833	886	939	20	4 21.2 20.8 20.4
40	939	992	*045	*098	*150	*203	*256	*308	*361	*413	*466	10	5 26.5 26.0 25.5
50	7.60 466	518	570	622	674	726	778	830	882	934	986	0 46	6 31.8 31.2 30.6
													7 37.1 36.4 35.7
14 0	986	*037	*089	*140	*192	*243	*295	*346	*397	*449	*500	50	8 42.4 41.6 40.8
10	7.61 500	551	602	653	704	754	805	856	906	957	*008	40	9 47.7 46.8 45.9
20	7.62 008	058	108	159	209	259	310	360	410	460	510	30	50 49 48
30	510	560	609	659	709	759	808	858	907	957	*006	20	1 5.0 4.9 4.8
40	7.63 006	055	105	154	203	252	301	350	399	448	497	10	2 10.0 9.8 9.6
50	497	546	594	643	692	740	789	837	885	934	982	0 45	3 15.0 14.7 14.4
													4 20.0 19.6 19.2
15 0	982	*030	*078	*127	*175	*223	*271	*318	*366	*414	*462	50	5 25.0 24.5 24.0
10	7.64 462	510	557	605	652	700	747	795	842	889	937	40	6 30.0 29.4 28.8
20	937	984	*031	*078	*125	*172	*219	*266	*313	*359	*406	30	7 35.0 34.3 33.6
30	7.65 406	453	499	546	592	639	685	732	778	824	871	20	8 40.0 39.2 38.4
40	871	917	963	*009	*055	*101	*147	*193	*239	*284	*330	10	9 45.0 44.1 43.2
50	7.66 330	376	421	467	513	558	604	649	694	740	785	0 44	
													47 46 45
16 0	785	830	875	920	966	*011	*056	*100	*145	*190	*235	50	1 4.7 4.6 4.5
10	7.67 235	280	324	369	414	458	503	547	592	636	680	40	2 9.4 9.2 9.0
20	680	725	769	813	857	901	946	990	*034	*077	*121	30	3 14.1 13.8 13.5
30	7.68 121	165	209	253	296	340	384	427	471	514	558	20	4 18.8 18.4 18.0
40	558	601	645	688	731	774	818	861	904	947	990	10	5 23.5 23.0 22.5
50	990	*033	*076	*119	*162	*204	*247	*290	*333	*375	*418	0 43	6 28.2 27.6 27.0
													7 32.9 32.2 31.5
17 0	7.69 418	460	503	545	588	630	673	715	757	799	842	50	8 37.6 36.8 36.0
10	842	884	926	968	*010	*052	*094	*136	*178	*219	*261	40	9 42.3 41.4 40.5
20	7.70 261	303	345	386	428	469	511	553	594	635	677	30	44 43 42
30	677	718	759	801	842	883	924	965	*006	*047	*088	20	1 4.4 4.3 4.2
40	7.71 088	129	170	211	252	293	334	374	415	456	496	10	2 8.8 8.6 8.4
50	496	537	577	618	658	699	739	779	820	860	900	0 42	3 13.2 12.9 12.6
													4 17.6 17.2 16.8
18 0	900	940	981	*021	*061	*101	*141	*181	*221	*261	*301	50	5 22.0 21.5 21.0
10	7.72 301	340	380	420	460	499	539	579	618	658	697	40	6 26.4 25.8 25.2
20	697	737	776	815	855	894	933	973	*012	*051	*090	30	7 30.8 30.1 29.4
30	7.73 090	129	168	207	246	285	324	363	402	441	480	20	8 35.2 34.4 33.6
40	480	518	557	596	635	673	712	750	789	827	866	10	9 39.6 38.7 37.8
50	866	904	943	981	*019	*058	*096	*134	*172	*210	*248	0 41	41 40 39
													1 4.1 4.0 3.9
19 0	7.74 248	286	325	363	401	438	476	514	552	590	628	50	2 8.2 8.0 7.8
10	628	665	703	741	779	816	854	891	929	966	*004	40	3 12.3 12.0 11.7
20	7.75 004	041	079	116	153	191	228	265	302	339	377	30	4 16.4 16.0 15.6
30	377	414	451	488	525	562	599	636	672	709	746	20	5 20.5 20.0 19.5
40	746	783	820	856	893	930	966	*003	*040	*076	*113	10	6 24.6 24.0 23.4
50	7.76 113	149	186	222	258	295	331	367	404	440	476	0 40	7 28.7 28.0 27.3
													8 32.8 32.0 31.2
	10′	9′	8′	7′	6′	5′	4′	3′	2′	1′	0′	′ ′	9 36.9 36.0 35.1
													38 37 36
													1 3.8 3.7 3.6
													2 7.6 7.4 7.2
													3 11.4 11.1 10.8
													4 15.2 14.8 14.4
													5 19.0 18.5 18.0
													6 22.8 22.2 21.6
													7 26.6 25.9 25.2
													8 30.4 29.6 28.8
													9 34.2 33.3 32.4
													P P

*179° 269° *359° 89° L Cot

L Cos | L Sin | 0° | *90° | 180° | *270°

9·99	′	″	0″	1″	2″	3″	4″	5″	6″	7″	8″	9″	10″	
999	20	0	7.76 475	512	548	584	620	656	692	728	764	800	836	50
999		10	836	872	907	943	979	*015	*051	*086	*122	*158	*193	40
999		20	7.77 193	229	264	300	335	371	406	442	477	512	548	30
999		30	548	583	618	654	689	724	759	794	829	864	899	20
999		40	899	934	969	*004	*039	*074	*109	*144	*179	*213	*248	10
999		50	7.78 248	283	318	352	387	422	456	491	525	560	594	0 35
999	21	0	594	629	663	698	732	766	801	835	869	903	938	50
999		10	938	972	*006	*040	*074	*108	*142	*176	*210	*244	*278	40
999		20	7.79 278	312	346	380	414	448	481	515	549	582	616	30
999		30	616	650	683	717	751	784	818	851	885	918	952	20
999		40	952	985	*018	*052	*085	*118	*152	*185	*218	*251	*284	10
999		50	7.80 284	317	351	384	417	450	483	516	549	582	615	0 34
999	22	0	615	647	680	713	746	779	812	844	877	910	942	50
999		10	942	975	*008	*040	*073	*105	*138	*170	*203	*235	*268	40
999		20	7.81 268	300	332	365	397	429	462	494	526	558	591	30
999		30	591	623	655	687	719	751	783	815	847	879	911	20
999		40	911	943	975	*007	*039	*070	*102	*134	*166	*198	*229	10
999		50	7.82 229	261	293	324	356	387	419	451	482	514	545	0 33
999	23	0	545	577	608	639	671	702	733	765	796	827	859	50
999		10	859	890	921	952	983	*015	*046	*077	*108	*139	*170	40
999		20	7.83 170	201	232	263	294	325	356	387	417	448	479	30
999		30	479	510	541	571	602	633	663	694	725	755	786	20
999		40	786	817	847	878	908	939	969	*000	*030	*060	*091	10
999		50	7.84 091	121	151	182	212	242	273	303	333	363	393	0 30
999	24	0	393	424	454	484	514	544	574	604	634	664	694	50
999		10	694	724	754	784	814	843	873	903	933	963	992	40
999		20	992	*022	*052	*082	*111	*141	*171	*200	*230	*259	*289	30
999		30	7.85 289	318	348	377	407	436	466	495	525	554	583	20
999		40	583	613	642	671	701	730	759	788	817	847	876	10
999		50	876	905	934	963	992	*021	*050	*079	*108	*137	*166	0 29
999	25	0	7.86 166	195	224	253	282	311	340	368	397	426	455	50
999		10	455	484	512	541	570	598	627	656	684	713	741	40
999		20	741	770	799	827	856	884	913	941	969	998	*026	30
999		30	7.87 026	055	083	111	140	168	196	224	253	281	309	20
999		40	309	337	366	394	422	450	478	506	534	562	590	10
999		50	590	618	646	674	702	730	758	786	814	842	870	0 28
999	26	0	870	897	925	953	981	*009	*036	*064	*092	*119	*147	50
999		10	7.88 147	175	202	230	258	285	313	340	368	395	423	40
999		20	423	450	478	505	533	560	587	615	642	669	697	30
999		30	697	724	751	779	806	833	860	888	915	942	969	20
999		40	969	996	*023	*050	*077	*105	*132	*159	*186	*213	*240	10
999		50	7.89 240	267	294	320	347	374	401	428	455	482	509	0 27
999	27	0	509	535	562	589	616	642	669	696	722	749	776	50
999		10	776	802	829	856	882	909	935	962	988	*015	*041	40
999		20	7.90 041	068	094	121	147	174	200	226	253	279	305	30
999		30	305	332	358	384	411	437	463	489	515	542	568	20
999		40	568	594	620	646	672	698	725	751	777	803	829	10
999		50	829	855	881	907	933	958	984	*010	*036	*062	*088	0 26
999	28	0	7.91 088	114	140	165	191	217	243	269	294	320	346	50
999		10	346	371	397	423	448	474	500	525	551	576	602	40
999		20	602	627	653	678	704	729	755	780	806	831	857	30
998		30	857	882	907	933	958	983	*009	*034	*059	*085	*110	20
998		40	7.92 110	135	160	186	211	236	261	286	311	336	362	10
998		50	362	387	412	437	462	487	512	537	562	587	612	0 25
998	29	0	612	637	662	687	712	737	761	786	811	836	861	50
998		10	861	886	910	935	960	985	*009	*034	*059	*084	*108	40
998		20	7.93 108	133	158	182	207	231	256	281	305	330	354	30
998		30	354	379	403	428	452	477	501	526	550	575	599	20
998		40	599	623	648	672	696	721	745	769	794	818	842	10
998		50	842	866	891	915	939	963	988	*012	*036	*060	*084	0 24
9·99			10″	9″	8″	7″	6″	5″	4″	3″	2″	1″	0″	′ ″

L Sin | *179° | 269° | *359° | 89° | L Cos

L Tan 0° *90° 180° *270°

′	0″	1′	2′	3′	4′	5′	6′	7′	8′	9′	10′		P P
20 0	7.76 476	512	548	585	621	657	693	729	765	801	837	50	37 36
10	837	872	908	944	980	*016	*051	*087	*123	*158	*194	40	1 3.7 3.6
20	7.77 194	230	265	301	336	372	407	442	478	513	549	30	2 7.4 7.2
30	549	584	619	654	690	725	760	795	830	865	900	20	3 11.1 10.8
40	900	935	970	*005	*040	*075	*110	*145	*179	*214	*249	10	4 14.8 14.4
50	7.78 249	284	318	353	388	422	457	492	526	561	595	0 39	5 18.5 18.0
													6 22.2 21.6
21 0	595	630	664	698	733	767	801	836	870	904	938	50	7 25.9 25.2
10	938	973	*007	*041	*075	*109	*143	*177	*211	*245	*279	40	8 29.6 28.8
20	7.79 279	313	347	381	415	448	482	516	550	583	617	30	9 33.3 32.4
30	617	651	684	718	751	785	819	852	886	919	952	20	35 34
40	952	986	*019	*053	*086	*119	*152	*186	*219	*252	*285	10	1 3.5 3.4
50	7.80 285	318	351	385	418	451	484	517	550	583	615	0 38	2 7.0 6.8
													3 10.5 10.2
22 0	615	648	681	714	747	780	812	845	878	911	943	50	4 14.0 13.6
10	943	976	*009	*041	*074	*106	*139	*171	*204	*236	*269	40	5 17.5 17.0
20	7.81 269	301	333	366	398	430	463	495	527	559	591	30	6 21.0 20.4
30	591	624	656	688	720	752	784	816	848	880	912	20	7 24.5 23.8
40	912	944	976	*008	*040	*071	*103	*135	*167	*198	*230	10	8 28.0 27.2
50	7.82 230	262	294	325	357	388	420	452	483	515	546	0 37	9 31.5 30.6
													33 32
23 0	546	578	609	640	672	703	734	766	797	828	860	50	1 3.3 3.2
10	860	891	922	953	984	*016	*047	*078	*109	*140	*171	40	2 6.6 6.4
20	7.83 171	202	233	264	295	326	357	388	418	449	480	30	3 9.9 9.6
30	480	511	542	572	603	634	664	695	726	756	787	20	4 13.2 12.8
40	787	818	848	879	909	940	970	*001	*031	*061	*092	10	5 16.5 16.0
50	7.84 092	122	152	183	213	243	274	304	334	364	394	0 36	6 19.8 19.2
													7 23.1 22.4
24 0	394	425	455	485	515	545	575	605	635	665	695	50	8 26.4 25.6
10	695	725	755	785	815	845	874	904	934	964	993	40	9 29.7 28.8
20	993	*023	*053	*083	*112	*142	*172	*201	*231	*260	*290	30	31 30
30	7.85 290	319	349	378	408	437	467	496	526	555	584	20	1 3.1 3.0
40	584	614	643	672	702	731	760	789	819	848	877	10	2 6.2 6.0
50	877	906	935	964	993	*022	*051	*080	*109	*138	*167	0 35	3 9.3 9.0
													4 12.4 12.0
25 0	7.86 167	196	225	254	283	312	341	370	398	427	456	50	5 15.5 15.0
10	456	485	513	542	571	600	628	657	685	714	743	40	6 18.6 18.0
20	743	771	800	828	857	885	914	942	971	999	*027	30	7 21.7 21.0
30	7.87 027	056	084	113	141	169	197	226	254	282	310	20	8 24.8 24.0
40	310	339	367	395	423	451	479	507	535	563	591	10	9 27.9 27.0
50	591	619	647	675	703	731	759	787	815	843	871	0 34	29 28
													1 2.9 2.8
26 0	871	899	926	954	982	*010	*037	*065	*093	*121	*148	50	2 5.8 5.6
10	7.88 148	176	204	231	259	286	314	342	369	397	424	40	3 8.7 8.4
20	424	452	479	506	534	561	589	616	643	671	698	30	4 11.6 11.2
30	698	725	753	780	807	834	862	889	916	943	970	20	5 14.5 14.0
40	970	997	*025	*052	*079	*106	*133	*160	*187	*214	*241	10	6 17.4 16.8
50	7.89 241	268	295	322	349	376	403	429	456	483	510	0 33	7 20.3 19.6
													8 23.2 22.4
27 0	510	537	563	590	617	644	670	697	724	750	777	50	9 26.1 25.2
10	777	804	830	857	884	910	937	963	990	*016	*043	40	27 26
20	7.90 043	069	096	122	149	175	201	228	254	280	307	30	1 2.7 2.6
30	307	333	359	386	412	438	464	491	517	543	569	20	2 5.4 5.2
40	569	595	622	648	674	700	726	752	778	804	830	10	3 8.1 7.8
50	830	856	882	908	934	960	986	*012	*038	*064	*089	0 32	4 10.8 10.4
													5 13.5 13.0
28 0	7.91 089	115	141	167	193	218	244	270	296	321	347	50	6 16.2 15.6
10	347	373	398	424	450	475	501	527	552	578	603	40	7 18.9 18.2
20	603	629	654	680	705	731	756	782	807	833	858	30	8 21.6 20.8
30	858	883	909	934	960	985	*010	*036	*061	*086	*111	20	9 24.3 23.4
40	7.92 111	137	162	187	212	237	263	288	313	338	363	10	25 24
50	363	388	413	438	463	488	513	538	563	588	613	0 31	1 2.5 2.4
													2 5.0 4.8
29 0	613	638	663	688	713	738	763	788	813	838	862	50	3 7.5 7.2
10	862	887	912	937	961	986	*011	*036	*060	*085	*110	40	4 10.0 9.6
20	7.93 110	134	159	184	208	233	258	282	307	331	356	30	5 12.5 12.0
30	356	380	405	429	454	478	503	527	552	576	601	20	6 15.0 14.4
40	601	625	649	674	698	722	747	771	795	820	844	10	7 17.5 16.8
50	844	868	892	917	941	965	989	*013	*038	*062	*086	0 30	8 20.0 19.2
													9 22.5 21.6
	10′	9′	8′	7′	6′	5′	4′	3′	2′	1′	0′	′ ′	P P

*179° 269° *359° 89° L Cot

9·99	′	″	0″	1″	2″	3″	4″	5″	6″	7″	8″	9″	10″	
998	30	0	7.94 084	108	132	157	181	205	229	253	277	301	325	50
998		10	325	349	373	397	421	445	469	492	516	540	564	40
998		20	564	588	612	636	659	683	707	731	755	778	802	30
998		30	802	826	849	873	897	921	944	968	991	*015	*039	20
998		40	7.95 039	062	086	109	133	157	180	204	227	251	274	10
998		50	274	298	321	344	368	391	415	438	461	485	508	0
998	31	0	508	532	555	578	601	625	648	671	695	718	741	50
998		10	741	764	787	811	834	857	880	903	926	950	973	40
998		20	973	996	*019	*042	*065	*088	*111	*134	*157	*180	*203	30
998		30	7.96 203	226	249	272	295	318	341	364	386	409	432	20
998		40	432	455	478	501	524	546	569	592	615	637	660	10
998		50	660	683	706	728	751	774	796	819	842	864	887	0
998	32	0	887	910	932	955	977	*000	*022	*045	*068	*090	*113	50
998		10	7.97 113	135	158	180	202	225	247	270	292	315	337	40
998		20	337	359	382	404	426	449	471	493	516	538	560	30
998		30	560	583	605	627	649	672	694	716	738	760	782	20
998		40	782	805	827	849	871	893	915	937	959	981	*003	10
998		50	7.98 003	025	048	070	092	114	136	157	179	201	223	0
998	33	0	223	245	267	289	311	333	355	377	398	420	442	50
998		10	442	464	486	508	529	551	573	595	616	638	660	40
998		20	660	682	703	725	747	768	790	812	833	855	876	30
998		30	876	898	920	941	963	984	*006	*027	*049	*070	*092	20
998		40	7.99 092	113	135	156	178	199	221	242	264	285	306	10
998		50	306	328	349	371	392	413	435	456	477	499	520	0
998	34	0	520	541	562	584	605	626	647	669	690	711	732	50
998		10	732	753	775	796	817	838	859	880	901	922	943	40
998		20	943	965	986	*007	*028	*049	*070	*091	*112	*133	*154	30
998		30	8.00 154	175	196	217	238	259	279	300	321	342	363	20
998		40	363	384	405	426	447	467	488	509	530	551	571	10
998		50	571	592	613	634	654	675	696	717	737	758	779	0
998	35	0	779	799	820	841	861	882	903	923	944	964	985	50
998		10	985	*006	*026	*047	*067	*088	*108	*129	*149	*170	*190	40
998		20	8.01 190	211	231	252	272	293	313	333	354	374	395	30
998		30	395	415	435	456	476	496	517	537	557	578	598	20
998		40	598	618	639	659	679	699	720	740	760	780	801	10
998		50	801	821	841	861	881	901	922	942	962	982	*002	0
998	36	0	8.02 002	022	042	062	082	102	123	143	163	183	203	50
998		10	203	223	243	263	283	303	323	343	362	382	402	40
998		20	402	422	442	462	482	502	522	542	561	581	601	30
998		30	601	621	641	661	680	700	720	740	759	779	799	20
998		40	799	819	838	858	878	898	917	937	957	976	996	10
998		50	996	*016	*035	*055	*074	*094	*114	*133	*153	*172	*192	0
997	37	0	8.03 192	212	231	251	270	290	309	329	348	368	387	50
997		10	387	407	426	446	465	484	504	523	543	562	581	40
997		20	581	601	620	640	659	678	698	717	736	756	775	30
997		30	775	794	813	833	852	871	891	910	929	948	967	20
997		40	967	987	*006	*025	*044	*063	*083	*102	*121	*140	*159	10
997		50	8.04 159	178	197	217	236	255	274	293	312	331	350	0
997	38	0	350	369	388	407	426	445	464	483	502	521	540	50
997		10	540	559	578	597	616	635	654	673	692	710	729	40
997		20	729	748	767	786	805	824	843	861	880	899	918	30
997		30	918	937	955	974	993	*012	*030	*049	*068	*087	*105	20
997		40	8.05 105	124	143	161	180	199	218	236	255	274	292	10
997		50	292	311	329	348	367	385	404	422	441	460	478	0
997	39	0	478	497	515	534	552	571	589	608	626	645	663	50
997		10	663	682	700	719	737	756	774	792	811	829	848	40
997		20	848	866	885	903	921	940	958	976	995	*013	*031	30
997		30	8.06 031	050	068	086	105	123	141	159	178	196	214	20
997		40	214	232	251	269	287	305	324	342	360	378	396	10
997		50	396	414	433	451	469	487	505	523	541	560	578	0
9·99			10″	9″	8″	7″	6″	5″	4″	3″	2″	1″	0″	′

′	0″	1″	2″	3″	4″	5″	6″	7″	8″	9″	10″		
30 0	7.94 086	110	134	158	182	206	230	254	278	302	326	50	
10	326	350	374	398	422	446	470	494	518	542	566	40	
20	566	590	613	637	661	685	709	732	756	780	804	30	
30	804	827	851	875	899	922	946	970	993	*017	*040	20	
40	7.95 040	064	088	111	135	158	182	205	229	252	276	10	
50	276	299	323	346	370	393	416	440	463	487	510	0	29
31 0	510	533	557	580	603	627	650	673	696	720	743	50	
10	743	766	789	812	836	859	882	905	928	951	974	40	
20	974	998	*021	*044	*067	*090	*113	*136	*159	*182	*205	30	
30	7.96 205	228	251	274	297	320	343	365	388	411	434	20	
40	434	457	480	503	525	548	571	594	617	639	662	10	
50	662	685	708	730	753	776	798	821	844	866	889	0	28
32 0	889	911	934	957	979	*002	*024	*047	*069	*092	*114	50	
10	7.97 114	137	159	182	204	227	249	272	294	317	339	40	
20	339	361	384	406	428	451	473	495	518	540	562	30	
30	562	585	607	629	651	673	696	718	740	762	784	20	
40	784	807	829	851	873	895	917	939	961	983	*005	10	
50	7.98 005	027	050	072	094	116	138	159	181	203	225	0	27
33 0	225	247	269	291	313	335	357	379	400	422	444	50	
10	444	466	488	510	531	553	575	597	618	640	662	40	
20	662	684	705	727	749	770	792	814	835	857	878	30	
30	878	900	922	943	965	986	*008	*029	*051	*073	*094	20	
40	7.99 094	116	137	158	180	201	223	244	266	287	308	10	
50	308	330	351	373	394	415	437	458	479	501	522	0	26
34 0	522	543	564	586	607	628	649	671	692	715	734	50	
10	734	755	777	798	819	840	861	882	903	925	946	40	
20	946	967	988	*009	*030	*051	*072	*093	*114	*135	*156	30	
30	8.00 156	177	198	219	240	261	282	303	324	344	365	20	
40	365	386	407	428	449	470	490	511	532	553	574	10	
50	574	594	615	636	657	677	698	719	740	760	781	0	25
35 0	781	802	822	843	964	884	905	925	946	967	987	50	
10	987	*008	*028	*049	*070	*090	*111	*131	*152	*172	*193	40	
20	8.01 193	213	234	254	274	295	315	336	356	377	397	30	
30	397	417	438	458	478	499	519	539	560	580	600	20	
40	600	621	641	661	682	702	722	742	762	783	803	10	
50	803	823	843	863	884	904	924	944	964	984	*004	0	24
36 0	8.02 004	025	045	065	085	105	125	145	165	185	205	50	
10	205	225	245	265	285	305	325	345	365	385	405	40	
20	405	425	445	464	484	504	524	544	564	584	604	30	
30	604	623	643	663	683	703	722	742	762	782	801	20	
40	801	821	841	861	880	900	920	939	959	979	998	10	
50	998	*018	*038	*057	*077	*097	*116	*136	*155	*175	*194	0	23
37 0	8.03 194	214	234	253	273	292	312	331	351	370	390	50	
10	390	409	429	448	468	487	506	526	545	565	584	40	
20	584	603	623	642	661	681	700	720	739	758	777	30	
30	777	797	816	835	855	874	893	912	932	951	970	20	
40	970	989	*008	*028	*047	*066	*085	*104	*124	*143	*162	10	
50	8.04 162	181	200	219	238	257	276	296	315	334	353	0	22
38 0	353	372	391	410	429	448	467	486	505	524	543	50	
10	543	562	581	600	619	638	656	675	694	713	732	40	
20	732	751	770	789	808	826	845	864	883	902	921	30	
30	921	939	958	977	996	*014	*033	*052	*071	*089	*108	20	
40	8.05 108	127	146	164	183	202	220	239	258	276	295	10	
50	295	314	332	351	369	388	407	425	444	462	481	0	21
39 0	481	499	518	537	555	574	592	611	629	648	666	50	
10	666	685	703	722	740	758	777	795	814	832	851	40	
20	851	869	887	906	924	943	961	979	998	*016	*034	30	
30	8.06 034	053	071	089	107	126	144	162	181	199	217	20	
40	217	235	254	272	290	308	326	345	363	381	399	10	
50	399	417	436	454	472	490	508	526	544	562	581	0	20
	10″	9″	8″	7″	6″	5″	4″	3″	2″	1″	0″	′	′

P	P
	25
1	2.5
2	5.0
3	7.5
4	10.0
5	12.5
6	15.0
7	17.5
8	20.0
9	22.5
	24 | 23
1	2.4 | 2.3
2	4.8 | 4.6
3	7.2 | 6.9
4	9.6 | 9.2
5	12.0 | 11.5
6	14.4 | 13.8
7	16.8 | 16.1
8	19.2 | 18.4
9	21.6 | 20.7
	22
1	2.2
2	4.4
3	6.6
4	8.8
5	11.0
6	13.2
7	15.4
8	17.6
9	19.8
	21
1	2.1
2	4.2
3	6.3
4	8.4
5	10.5
6	12.6
7	14.7
8	16.8
9	18.9
	20 | 19
1	2.0 | 1.9
2	4.0 | 3.8
3	6.0 | 5.7
4	8.0 | 7.6
5	10.0 | 9.5
6	12.0 | 11.4
7	14.0 | 13.3
8	16.0 | 15.2
9	18.0 | 17.1
	18
1	1.8
2	3.6
3	5.4
4	7.2
5	9.0
6	10.8
7	12.6
8	14.4
9	16.2

9·99	′	″	0′	1′	2′	3′	4′	5′	6′	7′	8′	9′	10′	
997	40	0	8.06 578	596	614	632	650	668	686	704	722	740	758	50
997		10	758	776	794	812	830	848	866	884	902	920	938	40
997		20	938	956	974	992	*010	*028	*046	*063	*081	*099	*117	30
997		30	8.07 117	135	153	171	189	206	224	242	260	278	295	20
997		40	295	313	331	349	367	384	402	420	438	455	473	10
997		50	473	491	509	526	544	562	579	597	615	632	650	0
997	41	0	650	668	685	703	721	738	756	773	791	809	826	50
997		10	826	844	861	879	896	914	932	949	967	984	*002	40
997		20	8.08 002	019	037	054	072	089	107	124	141	159	176	30
997		30	176	194	211	229	246	263	281	298	316	333	350	20
997		40	350	368	385	403	420	437	455	472	489	506	524	10
997		50	524	541	558	576	593	610	627	645	662	679	696	0
997	42	0	696	714	731	748	765	783	800	817	834	851	868	50
997		10	868	886	903	920	937	954	971	988	*006	*023	*040	40
997		20	8.09 040	057	074	091	108	125	142	159	176	193	210	30
997		30	210	227	244	261	278	295	312	329	346	363	380	20
997		40	380	397	414	431	448	465	482	499	516	533	550	10
997		50	550	567	583	600	617	634	651	668	685	701	718	0
997	43	0	718	735	752	769	786	802	819	836	853	870	886	50
997		10	886	903	920	937	953	970	987	*004	*020	*037	*054	40
997		20	8.10 054	070	087	104	120	137	154	170	187	204	220	30
997		30	220	237	254	270	287	303	320	337	353	370	386	20
996		40	386	403	420	436	453	469	486	502	519	535	552	10
996		50	552	568	585	601	618	634	651	667	684	700	717	0
996	44	0	717	733	750	766	782	799	815	832	848	864	881	50
996		10	881	897	914	930	946	963	979	995	*012	*028	*044	40
996		20	8.11 044	061	077	093	110	126	142	159	175	191	207	30
996		30	207	224	240	256	272	289	305	321	337	354	370	20
996		40	370	386	402	418	435	451	467	483	499	515	531	10
996		50	531	548	564	580	596	612	628	644	660	677	693	0
996	45	0	693	709	725	741	757	773	789	805	821	837	853	50
996		10	853	869	885	901	917	933	949	965	981	997	*013	40
996		20	8.12 013	029	045	061	077	093	109	125	141	157	172	30
996		30	172	188	204	220	236	252	268	284	300	315	331	20
996		40	331	347	363	379	395	410	426	442	458	474	489	10
996		50	489	505	521	537	553	568	584	600	616	631	647	0
996	46	0	647	663	679	694	710	726	741	757	773	788	804	50
996		10	804	820	836	851	867	882	898	914	929	945	961	40
996		20	961	976	992	*007	*023	*039	*054	*070	*085	*101	*117	30
996		30	8.13 117	132	148	163	179	194	210	225	241	256	272	20
996		40	272	287	303	318	334	349	365	380	396	411	427	10
996		50	427	442	458	473	489	504	519	535	550	566	581	0
996	47	0	581	596	612	627	643	658	673	689	704	719	735	50
996		10	735	750	765	781	796	811	827	842	857	873	888	40
996		20	888	903	919	934	949	964	980	995	*010	*025	*041	30
996		30	8.14 041	056	071	086	101	117	132	147	162	178	193	20
996		40	193	208	223	238	253	269	284	299	314	329	344	10
996		50	344	359	375	390	405	420	435	450	465	480	495	0
996	48	0	495	510	525	541	556	571	586	601	616	631	646	50
996		10	646	661	676	691	706	721	736	751	766	781	796	40
996		20	796	811	826	841	856	871	886	901	915	930	945	30
996		30	945	960	975	990	*005	*020	*035	*050	*065	*079	*094	20
996		40	8.15 094	109	124	139	154	169	183	198	213	228	243	10
996		50	243	258	272	287	302	317	332	346	361	376	391	0
996	49	0	391	406	420	435	450	465	479	494	509	523	538	50
996		10	538	553	568	582	597	612	626	641	656	670	685	40
996		20	685	700	714	729	744	758	773	788	802	817	832	30
995		30	832	846	861	875	890	905	919	934	948	963	978	20
995		40	978	992	*007	*021	*036	*050	*065	*079	*094	*109	*123	10
995		50	8.16 123	138	152	167	181	196	210	225	239	254	268	0
9·99			10′	9′	8′	7′	6′	5′	4′	3′	2′	1′	0′	′ ″

Sin *179° 269° *359° 89° L Cos

′ ″	0″	1″	2″	3″	4″	5″	6″	7″	8″	9″	10″		P	P
40 0	8.06 581	599	617	635	653	671	689	707	725	743	761			
10	761	779	797	815	833	851	869	887	905	923	941	50		
20	941	959	977	995	*013	*031	*049	*066	*084	*102	*120	40		
30	8.07 120	138	156	174	192	209	227	245	263	281	298	30		
40	298	316	334	352	370	387	405	423	441	458	476	20		18
50	476	494	512	529	547	565	582	600	618	635	653	10	1	1.8
41 0	653	671	688	706	724	741	759	776	794	812	829	0 19	2	3.6
10	829	847	864	882	900	917	935	952	970	987	*005	50	3	5.4
20	8.08 005	022	040	057	075	092	110	127	145	162	180	40	4	7.2
30	180	197	214	232	249	267	284	301	319	336	354	30	5	9.0
40	354	371	388	406	423	440	458	475	492	510	527	20	6	10.8
50	527	544	562	579	596	613	631	648	665	682	700	10	7	12.6
42 0	700	717	734	751	769	786	803	820	837	855	872	0 18	8	14.4
10	872	889	906	923	940	957	975	992	*009	*026	*043	50	9	16.2
20	8.09 043	060	077	094	111	128	146	163	180	197	214	40		
30	214	231	248	265	282	299	316	333	350	367	384	30		
40	384	401	418	435	452	468	485	502	519	536	553	20		17
50	553	570	587	604	621	637	654	671	688	705	722	10	1	1.7
43 0	722	739	755	772	789	806	823	839	856	873	890	0 17	2	3.4
10	890	907	923	940	957	974	990	*007	*024	*040	*057	50	3	5.1
20	8.10 057	074	091	107	124	141	157	174	191	207	224	40	4	6.8
30	224	240	257	274	290	307	324	340	357	373	390	30	5	8.5
40	390	407	423	440	456	473	489	506	522	539	555	20	6	10.2
50	555	572	588	605	621	638	654	671	687	704	720	10	7	11.9
44 0	720	737	753	770	786	802	819	835	852	868	884	0 16	8	13.6
10	884	901	917	934	950	966	983	999	*015	*032	*048	50	9	15.3
20	8.11 048	064	081	097	113	130	146	162	178	195	211	40		
30	211	227	244	260	276	292	309	325	341	357	373	30		
40	373	390	406	422	438	454	471	487	503	519	535	20		16
50	535	551	567	584	600	616	632	648	664	680	696	10	1	1.6
0	696	712	729	745	761	777	793	809	825	841	857	0 15	2	3.2
10	857	873	889	905	921	937	953	969	985	*001	*017	50	3	4.8
20	8.12 017	033	049	065	081	097	113	129	144	160	176	40	4	6.4
30	176	192	208	224	240	256	272	288	303	319	335	30	5	8.0
40	335	351	367	383	398	414	430	446	462	478	493	20	6	9.6
50	493	509	525	541	556	572	588	604	620	635	651	10	7	11.2
0	651	667	682	698	714	730	745	761	777	792	808	0 14	8	12.8
10	808	824	839	855	871	886	902	918	933	949	965	50	9	14.4
20	965	980	996	*011	*027	*043	*058	*074	*089	*105	*121	40		
30	8.13 121	136	152	167	183	198	214	229	245	260	276	30		
40	276	291	307	322	338	353	369	384	400	415	431	20		15
50	431	446	462	477	493	508	523	539	554	570	585	10	1	1.5
0	585	601	616	631	647	662	677	693	708	724	739	0 13	2	3.0
10	739	754	770	785	800	816	831	846	861	877	892	50	3	4.5
20	892	907	923	938	953	968	984	999	*014	*029	*045	40	4	6.0
30	8.14 045	060	075	090	106	121	136	151	166	182	197	30	5	7.5
40	197	212	227	242	258	273	288	303	318	333	348	20	6	9.0
50	348	364	379	394	409	424	439	454	469	484	500	10	7	10.5
0	500	515	530	545	560	575	590	605	620	635	650	0 12	8	12.0
10	650	665	680	695	710	725	740	755	770	785	800	50	9	13.5
20	800	815	830	845	860	875	890	905	920	935	950	40		
30	950	965	980	994	*009	*024	*039	*054	*069	*084	*099	30		14
40	8.15 099	114	128	143	158	173	188	203	218	232	247	20	1	1.4
50	247	262	277	292	306	321	336	351	366	380	395	10	2	2.8
0	395	410	425	439	454	469	484	498	513	528	543	0 11	3	4.2
10	543	557	572	587	602	616	631	646	660	675	690	50	4	5.6
20	690	704	719	734	748	763	778	792	807	822	836	40	5	7.0
30	836	851	865	880	895	909	924	938	953	968	982	30	6	8.4
40	982	997	*011	*026	*040	*055	*070	*084	*099	*113	*128	20	7	9.8
50	8.16 128	142	157	171	186	200	215	229	244	258	273	10	8	11.2
	10″	9″	8″	7″	6″	5″	4″	3″	2″	1″	0″	″ ′	9	12.6
	*179°	269°	*359		89°					L Cot			P	P

L Cos		L Sin					0°			*90°	180°	*270°
9·99	′ ″	0″	1″	2″	3″	4″	5″	6″	7″	8″	9″	10″
995	50 0	8.16 268	283	297	311	326	340	355	369	384	398	413
995	10	413	427	441	456	470	485	499	513	528	542	557
995	20	557	571	585	600	614	628	643	657	672	686	700
995	30	700	715	729	743	757	772	786	800	815	829	843
995	40	843	858	872	886	900	915	929	943	957	972	986
995	50	986	*000	*014	*029	*043	*057	*071	*085	*100	*114	*128
995	51 0	8.17 128	142	156	171	185	199	213	227	241	256	270
995	10	270	284	298	312	326	340	355	369	383	397	411
995	20	411	425	439	453	467	481	495	510	524	538	552
995	30	552	566	580	594	608	622	636	650	664	678	692
995	40	692	706	720	734	748	762	776	790	804	818	832
995	50	832	846	860	874	888	902	916	930	943	957	971
995	52 0	971	985	999	*013	*027	*041	*055	*069	*082	*096	*110
995	10	8.18 110	124	138	152	166	180	193	207	221	235	249
995	20	249	263	276	290	304	318	332	345	359	373	387
995	30	387	401	414	428	442	456	469	483	497	511	524
995	40	524	538	552	566	579	593	607	621	634	648	662
995	50	662	675	689	703	716	730	744	757	771	785	798
995	53 0	798	812	826	839	853	867	880	894	908	921	935
995	10	935	948	962	976	989	*003	*016	*030	*044	*057	*071
995	20	8.19 071	084	098	111	125	139	152	166	179	193	206
995	30	206	220	233	247	260	274	287	301	314	328	341
995	40	341	355	368	382	395	409	422	436	449	463	476
995	50	476	489	503	516	530	543	557	570	583	597	610
995	54 0	610	624	637	650	664	677	691	704	717	731	744
995	10	744	757	771	784	797	811	824	837	851	864	877
995	20	877	891	904	917	931	944	957	971	984	997	*010
995	30	8.20 010	024	037	050	064	077	090	103	117	130	143
995	40	143	156	170	183	196	209	222	236	249	262	275
994	50	275	288	302	315	328	341	354	368	381	394	407
994	55 0	407	420	433	446	460	473	486	499	512	525	538
994	10	538	552	565	578	591	604	617	630	643	656	669
994	20	669	682	696	709	722	735	748	761	774	787	800
994	30	800	813	826	839	852	865	878	891	904	917	930
994	40	930	943	956	969	982	995	*008	*021	*034	*047	*060
994	50	8.21 060	073	086	099	112	125	138	151	164	177	189
994	56 0	189	202	215	228	241	254	267	280	293	306	319
994	10	319	331	344	357	370	383	396	409	422	434	447
994	20	447	460	473	486	499	511	524	537	550	563	576
994	30	576	588	601	614	627	640	652	665	678	691	703
994	40	703	716	729	742	754	767	780	793	805	818	831
994	50	831	844	856	869	882	895	907	920	933	945	958
994	57 0	958	971	983	996	*009	*022	*034	*047	*060	*072	*085
994	10	8.22 085	098	110	123	136	148	161	173	186	199	211
994	20	211	224	237	249	262	274	287	300	312	325	337
994	30	337	350	363	375	388	400	413	425	438	451	463
994	40	463	476	488	501	513	526	538	551	563	576	588
994	50	588	601	613	626	638	651	663	676	688	701	713
994	58 0	713	726	738	751	763	776	788	801	813	826	838
994	10	838	850	863	875	888	900	913	925	937	950	962
994	20	962	975	987	999	*012	*024	*037	*049	*061	*074	*086
994	30	8.23 086	098	111	123	136	148	160	173	185	197	210
994	40	210	222	234	247	259	271	284	296	308	321	333
994	50	333	345	357	370	382	394	407	419	431	443	456
994	59 0	456	468	480	492	505	517	529	541	554	566	578
994	10	578	590	603	615	627	639	652	664	676	688	700
994	20	700	713	725	737	749	761	773	786	798	810	822
993	30	822	834	846	859	871	883	895	907	919	931	944
993	40	944	956	968	980	992	*004	*016	*028	*041	*053	*065
993	50	8.24 065	077	089	101	113	125	137	149	161	173	186
9·99		10″	9″	8″	7″	6″	5″	4″	3″	2″	1″	0″
L Sin		*179°	269°	*359			89°				L Cos	

′ ″	0″	1″	2″	3″	4″	5″	6″	7″	8″	9″	10″		P P
50 0	8.16 273	287	302	316	331	345	359	374	388	403	417	50	
10	417	432	446	460	475	489	504	518	533	547	561	40	
20	561	576	590	604	619	633	647	662	676	691	705	30	
30	705	719	734	748	762	776	791	805	819	834	848	20	
40	848	862	877	891	905	919	934	948	962	976	991	10	
50	991	*005	*019	*033	*048	*062	*076	*090	*104	*119	*133	0 9	15
51 0	8.17 133	147	161	175	190	204	218	232	246	260	275	50	1 1.5
10	275	289	303	317	331	345	359	373	388	402	416	40	2 3.0
20	416	430	444	458	472	486	500	514	528	543	557	30	3 4.5
30	557	571	585	599	613	627	641	655	669	683	697	20	4 6.0
40	697	711	725	739	753	767	781	795	809	823	837	10	5 7.5
50	837	851	865	879	893	907	921	934	948	962	976	0 8	6 9.0
52 0	976	990	*004	*018	*032	*046	*060	*074	*087	*101	*115	50	7 10.5
10	8.18 115	129	143	157	171	185	198	212	226	240	254	40	8 12.0
20	254	268	281	295	309	323	337	351	364	378	392	30	9 13.5
30	392	406	419	433	447	461	475	488	502	516	530	20	
40	530	543	557	571	585	598	612	626	639	653	667	10	
50	667	681	694	708	722	735	749	763	776	790	804	0 7	
53 0	804	817	831	845	858	872	886	899	913	926	940	50	
10	940	954	967	981	994	*008	*022	*035	*049	*062	*076	40	14
20	8.19 076	090	103	117	130	144	157	171	184	198	211	30	1 1.4
30	211	225	239	252	266	279	293	306	320	333	347	20	2 2.8
40	347	360	374	387	401	414	427	441	454	468	481	10	3 4.2
50	481	495	508	522	535	548	562	575	589	602	616	0 6	4 5.6
54 0	616	629	642	656	669	683	696	709	723	736	749	50	5 7.0
10	749	763	776	789	803	816	830	843	856	870	883	40	6 8.4
20	883	896	910	923	936	949	963	976	989	*003	*016	30	7 9.8
30	8.20 016	029	042	056	069	082	096	109	122	135	149	20	8 11.2
40	149	162	175	188	201	215	228	241	254	268	281	10	9 12.6
50	281	294	307	320	334	347	360	373	386	399	413	0 5	
55 0	413	426	439	452	465	478	491	505	518	531	544	50	
10	544	557	570	583	596	610	623	636	649	662	675	40	
20	675	688	701	714	727	740	753	767	780	793	806	30	13
30	806	819	832	845	858	871	884	897	910	923	936	20	1 1.3
40	936	949	962	975	988	*001	*014	*027	*040	*053	*066	10	2 2.6
50	8.21 066	079	092	105	118	131	144	156	169	182	195	0 4	3 3.9
56 0	195	208	221	234	247	260	273	286	299	311	324	50	4 5.2
10	324	337	350	363	376	389	402	414	427	440	453	40	5 6.5
20	453	466	479	492	504	517	530	543	556	569	581	30	6 7.8
30	581	594	607	620	633	645	658	671	684	697	709	20	7 9.1
40	709	722	735	748	760	773	786	799	811	824	837	10	8 10.4
50	837	850	862	875	888	901	913	926	939	951	964	0 3	9 11.7
57 0	964	977	989	*002	*015	*028	*040	*053	*066	*078	*091	50	
10	8.22 091	104	116	129	142	154	167	179	192	205	217	40	
20	217	230	243	255	268	280	293	306	318	331	343	30	
30	343	356	369	381	394	406	419	431	444	457	469	20	
40	469	482	494	507	519	532	544	557	569	582	595	10	12
50	595	607	620	632	645	657	670	682	695	707	720	0 2	1 1.2
58 0	720	732	744	757	769	782	794	807	819	832	844	50	2 2.4
10	844	857	869	881	894	906	919	931	944	956	968	40	3 3.6
20	968	981	993	*006	*018	030	*043	*055	*068	*080	*092	30	4 4.8
30	8.23 092	105	117	130	142	154	167	179	191	204	216	20	5 6.0
40	216	228	241	253	265	278	290	302	315	327	339	10	6 7.2
50	339	352	364	376	388	401	413	425	438	450	462	0 1	7 8.4
59 0	462	474	487	499	511	523	536	548	560	572	585	50	8 9.6
10	585	597	609	621	634	646	658	670	682	695	707	40	9 10.8
20	707	719	731	743	756	768	780	792	804	816	829	30	
30	829	841	853	865	877	889	902	914	926	938	950	20	
40	950	962	974	987	999	*011	*023	*035	*047	*059	*071	10	
50	8.24 071	083	096	108	120	132	144	156	168	180	192	0 0	
	10″	9″	8″	7″	6″	5″	4″	3″	2″	1″	0″	′ ″	P P

'	0°	10′	20′	30′	40′	50′	60′	
0	8.24 186	306	426	546	665	785	903	59
1	903	*022	*140	*258	*375	*493	*609	58
2	8.25 609	726	842	958	*074	*189	*304	57
3	8.26 304	419	533	648	761	875	988	56
4	988	*101	*214	*326	*438	*550	*661	55
5	8.27 661	773	883	994	*104	*215	*324	54
6	8.28 324	434	543	652	761	869	977	53
7	977	*085	*193	*300	*407	*514	*621	52
8	8.29 621	727	833	939	*044	*150	*255	51
9	8.30 255	359	464	568	672	776	879	50
10	879	983	*086	*188	*291	*393	*495	49
11	8.31 495	597	699	800	901	*002	*103	48
12	8.32 103	203	303	403	503	602	702	47
13	702	801	899	998	*096	*195	*292	46
14	8.33 292	390	488	585	682	779	875	45
15	875	972	*068	*164	*260	*355	*450	44
16	8.34 450	546	640	735	830	924	*018	43
17	8.35 018	112	206	299	392	485	578	42
18	578	671	764	856	948	*040	*131	41
19	8.36 131	223	314	405	496	587	678	40
20	678	768	858	948	*038	*128	*217	39
21	8.37 217	306	395	484	573	662	750	38
22	750	838	926	*014	*101	*189	*276	37
23	8.38 276	363	450	537	624	710	796	36
24	796	882	968	*054	*139	*225	*310	35
25	8.39 310	395	480	565	649	734	818	34
26	818	902	986	*070	*153	*237	*320	33
27	8.40 320	403	486	569	651	734	816	32
28	816	898	980	*062	*144	*225	*307	31
29	8.41 307	388	469	550	631	711	792	30
30	792	872	952	*032	*112	*192	*272	29
31	8.42 272	351	430	510	589	667	746	28
32	746	825	903	982	*060	*138	*216	27
33	8.43 216	293	371	448	526	603	680	26
34	680	757	834	910	987	*063	*139	25
35	8.44 139	216	292	367	443	519	594	24
36	594	669	745	820	895	969	*044	23
37	8.45 044	119	193	267	341	415	489	22
38	489	563	637	710	784	857	930	21
39	930	*003	*076	*149	*222	*294	*366	20
40	8.46 366	439	511	583	655	727	799	19
41	799	870	942	*013	*084	*155	*226	18
42	8.47 226	297	368	439	509	580	650	17
43	650	720	790	860	930	*000	*069	16
44	8.48 069	139	208	278	347	416	485	15
45	485	554	622	691	760	828	896	14
46	896	965	*033	*101	*169	*236	*304	13
47	8.49 304	372	439	506	574	641	708	12
48	708	775	842	908	975	*042	*108	11
49	8.50 108	174	241	307	373	439	504	10
50	504	570	636	701	767	832	897	9
51	897	963	*028	*092	*157	*222	*287	8
52	8.51 287	351	416	480	544	609	673	7
53	673	737	801	864	928	992	*055	6
54	8.52 055	119	182	245	308	371	434	5
55	434	497	560	623	685	748	810	4
56	810	872	935	997	*059	*121	*183	3
57	8.53 183	245	306	368	429	491	552	2
58	552	614	675	736	797	858	919	1
59	919	979	*040	*101	*162	*222	*282	0
	60′	50′	40′	30′	20′	10′	0′	'

Sin *178° 268° *358°

88°

L Cos

	P	P		
	120	119	118	
1	12.0	11.9	11.8	
2	24.0	23.8	23.6	
3	36.0	35.7	35.4	
4	48.0	47.6	47.2	
5	60.0	59.5	59.0	
6	72.0	71.4	70.8	
7	84.0	83.3	82.6	
8	96.0	95.2	94.4	
9	108.0	107.1	106.2	
	117	116	115	
1	11.7	11.6	11.5	
2	23.4	23.2	23.0	
3	35.1	34.8	34.5	
4	46.8	46.4	46.0	
5	58.5	58.0	57.5	
6	70.2	69.6	69.0	
7	81.9	81.2	80.5	
8	93.6	92.8	92.0	
9	105.3	104.4	103.5	
	114	113	112	11
1	11.4	11.3	11.2	11.
2	22.8	22.6	22.4	22.
3	34.2	33.9	33.6	33.
4	45.6	45.2	44.8	44.
5	57.0	56.5	56.0	55.
6	68.4	67.8	67.2	66.
7	79.8	79.1	78.4	77.
8	91.2	90.4	89.6	88.
9	102.6	101.7	100.8	99.
	110	109	108	10
1	11.0	10.9	10.8	10.
2	22.0	21.8	21.6	21.
3	33.0	32.7	32.4	32.
4	44.0	43.6	43.2	42.
5	55.0	54.5	54.0	53.
6	66.0	65.4	64.8	64.
7	77.0	76.3	75.6	74.
8	88.0	87.2	86.4	85.
9	99.0	98.1	97.2	96.
	106	105	104	10
1	10.6	10.5	10.4	10.
2	21.2	21.0	20.8	20.
3	31.8	31.5	31.2	30.
4	42.4	42.0	41.6	41.
5	53.0	52.5	52.0	51.
6	63.6	63.0	62.4	61.
7	74.2	73.5	72.8	72.
8	84.8	84.0	83.2	82.
9	95.4	94.5	93.6	92.
	102	101	100	9
1	10.2	10.1	10.0	9.
2	20.4	20.2	20.0	19.
3	30.6	30.3	30.0	29.
4	40.8	40.4	40.0	39.
5	51.0	50.5	50.0	49.
6	61.2	60.6	60.0	59.
7	71.4	70.7	70.0	69.
8	81.6	80.8	80.0	79.
9	91.8	90.9	90.0	89.
	98	97	96	9
1	9.8	9.7	9.6	9.
2	19.6	19.4	19.2	19.
3	29.4	29.1	28.8	28.
4	39.2	38.8	38.4	38.
5	49.0	48.5	48.0	47.
6	58.8	58.2	57.6	57.
7	68.6	67.9	67.2	66.
8	78.4	77.6	76.8	76.
9	88.2	87.3	86.4	85.

P P

′	0°	10′	20′	30′	40′	50′	60″	
0	8.24 192	313	433	553	672	791	910	59
1	910	*029	*147	*265	*382	*500	*616	58
2	8.25 616	733	849	965	*081	*196	*312	57
3	8.26 312	426	541	655	769	882	996	56
4	996	*109	*221	*334	*446	*558	*669	55
5	8.27 669	780	891	*002	*112	*223	*332	54
6	8.28 332	442	551	660	769	877	986	53
7	986	*094	*201	*309	*416	*523	*629	52
8	8.29 629	736	842	947	*053	*158	*203	51
9	8.30 263	368	473	577	681	785	888	50
10	888	992	*095	*198	*300	*403	*505	49
11	8.31 505	606	708	809	911	*012	*112	48
12	8.32 112	213	313	413	513	612	711	47
13	711	810	909	*008	*106	*205	*302	46
14	8.33 302	400	498	595	692	789	886	45
15	886	982	*078	*174	*270	*366	*461	44
16	8.34 461	556	651	746	840	935	*029	43
17	8.35 029	123	217	310	403	497	590	42
18	590	682	775	867	959	*051	*143	41
19	8.36 143	235	326	417	508	599	689	40
20	689	780	870	960	*050	*140	*229	39
21	8.37 229	318	408	497	585	674	762	38
22	762	850	938	*026	*114	*202	*289	37
23	8.38 289	376	463	550	636	723	809	36
24	809	895	981	*067	*153	*238	*323	35
25	8.39 323	408	493	578	663	747	832	34
26	832	916	*000	*083	*167	*250	*334	33
27	8.40 334	417	500	583	665	748	830	32
28	830	913	995	*077	*158	*240	*321	31
29	8.41 321	403	484	565	646	726	807	30
30	807	887	967	*048	*127	*207	*287	29
31	8.42 287	366	446	525	604	683	762	28
32	762	840	919	997	*073	*154	*232	27
33	8.43 232	309	387	464	542	619	696	26
34	696	773	850	927	*003	*080	*156	25
35	8.44 156	232	308	384	460	536	611	24
36	611	686	762	837	912	987	*061	23
37	8.45 061	136	210	285	359	433	507	22
38	507	581	655	728	802	875	948	21
39	948	*021	*094	*167	*240	*312	*385	20
40	8.46 385	457	529	602	674	745	817	19
41	817	889	960	*032	*103	*174	*245	18
42	8.47 245	316	387	458	528	599	669	17
43	669	740	810	880	950	*020	*089	16
44	8.48 089	159	228	298	367	436	505	15
45	505	574	643	711	780	849	917	14
46	917	985	*053	*121	*189	*257	*325	13
47	8.49 325	393	460	528	595	662	729	12
48	729	796	863	930	997	*063	*130	11
49	8.50 130	196	263	329	395	461	527	10
50	527	593	658	724	789	855	920	9
51	920	985	*050	*115	*180	*245	*310	8
52	8.51 310	374	439	503	568	632	696	7
53	696	760	824	888	952	*015	*079	6
54	8.52 079	143	206	269	332	396	459	5
55	459	522	584	647	710	772	835	4
56	835	897	960	*022	*084	*146	*208	3
57	8.53 208	270	332	393	455	516	578	2
58	578	639	700	762	823	884	945	1
59	945	*005	*066	*127	*187	*248	*308	0
	60°	50′	40′	30′	20′	10′	0°	′

*178° 268° *358° 88° L Cot

P P

	94	93	92	91	90
1	9.4	9.3	9.2	9.1	9.0
2	18.8	18.6	18.4	18.2	18.0
3	28.2	27.9	27.6	27.3	27.0
4	37.6	37.2	36.8	36.4	36.0
5	47.0	46.5	46.0	45.5	45.0
6	56.4	55.8	55.2	54.6	54.0
7	65.8	65.1	64.4	63.7	63.0
8	75.2	74.4	73.6	72.8	72.0
9	84.6	83.7	82.8	81.9	81.0

	89	88	87	86	85
1	8.9	8.8	8.7	8.6	8.5
2	17.8	17.6	17.4	17.2	17.0
3	26.7	26.4	26.1	25.8	25.5
4	35.6	35.2	34.8	34.4	34.0
5	44.5	44.0	43.5	43.0	42.5
6	53.4	52.8	52.2	51.6	51.0
7	62.3	61.6	60.9	60.2	59.5
8	71.2	70.4	69.6	68.8	68.0
9	80.1	79.2	78.3	77.4	76.5

	84	83	82	81	80
1	8.4	8.3	8.2	8.1	8.0
2	16.8	16.6	16.4	16.2	16.0
3	25.2	24.9	24.6	24.3	24.0
4	33.6	33.2	32.8	32.4	32.0
5	42.0	41.5	41.0	40.5	40.0
6	50.4	49.8	49.2	48.6	48.0
7	58.8	58.1	57.4	56.7	56.0
8	67.2	66.4	65.6	64.8	64.0
9	75.6	74.7	73.8	72.9	72.0

	79	78	77	76	75
1	7.9	7.8	7.7	7.6	7.5
2	15.8	15.6	15.4	15.2	15.0
3	23.7	23.4	23.1	22.8	22.5
4	31.6	31.2	30.8	30.4	30.0
5	39.5	39.0	38.5	38.0	37.5
6	47.4	46.8	46.2	45.6	45.0
7	55.3	54.6	53.9	53.2	52.5
8	63.2	62.4	61.6	60.8	60.0
9	71.1	70.2	69.3	68.4	67.5

	74	73	72	71	70
1	7.4	7.3	7.2	7.1	7.0
2	14.8	14.6	14.4	14.2	14.0
3	22.2	21.9	21.6	21.3	21.0
4	29.6	29.2	28.8	28.4	28.0
5	37.0	36.5	36.0	35.5	35.0
6	44.4	43.8	43.2	42.6	42.0
7	51.8	51.1	50.4	49.7	49.0
8	59.2	58.4	57.6	56.8	56.0
9	66.6	65.7	64.8	63.9	63.0

	69	68	67	66	65
1	6.9	6.8	6.7	6.6	6.5
2	13.8	13.6	13.4	13.2	13.0
3	20.7	20.4	20.1	19.8	19.5
4	27.6	27.2	26.8	26.4	26.0
5	34.5	34.0	33.5	33.0	32.5
6	41.4	40.8	40.2	39.6	39.0
7	48.3	47.6	46.9	46.2	45.5
8	55.2	54.4	53.6	52.8	52.0
9	62.1	61.2	60.3	59.4	58.5

	64	63	62	61	60
1	6.4	6.3	6.2	6.1	6.0
2	12.8	12.6	12.4	12.2	12.0
3	19.2	18.9	18.6	18.3	18.0
4	25.6	25.2	24.8	24.4	24.0
5	32.0	31.5	31.0	30.5	30.0
6	38.4	37.8	37.2	36.6	36.0
7	44.8	44.1	43.4	42.7	42.0
8	51.2	50.4	49.6	48.8	48.0
9	57.6	56.7	55.8	54.9	54.0

P P

99	′	0′	10′	20′	30′	40′	50′	60′			P
74	0	8.54 282	342	402	462	522	582	642	59	973	61
73	1	642	702	762	821	881	940	999	58	973	1 6
73	2	999	*059	*118	*177	*236	*295	*354	57	972	2 12
72	3	8.55 354	413	471	530	589	647	705	56	972	3 18
72	4	705	764	822	880	938	996	*054	55	971	4 24
71	5	8.56 054	112	170	227	285	342	400	54	971	5 30
71	6	400	457	515	572	629	686	743	53	970	6 36
70	7	743	800	857	914	970	*027	*084	52	970	7 42
70	8	8.57 084	140	196	253	309	365	421	51	969	8 48
69	9	421	477	533	589	645	701	757	50	969	9 54
69	10	757	812	868	923	979	*034	*089	49	968	60
68	11	8.58 089	144	200	255	310	364	419	48	968	1 6
68	12	419	474	529	583	638	693	747	47	967	2 12
67	13	747	801	856	910	964	*018	*072	46	967	3 18
67	14	8.59 072	126	180	234	288	341	395	45	967	4 24
67	15	395	448	502	555	609	662	715	44	966	5 30
66	16	715	768	821	874	927	980	*033	43	966	6 36
66	17	8.60 033	086	139	191	244	296	349	42	965	7 42
65	18	349	401	454	506	558	610	662	41	964	8 48
64	19	662	714	766	818	870	922	973	40	964	9 54
64	20	973	*025	*077	*128	*180	*231	*282	39	963	59
63	21	8.61 282	334	385	436	487	538	589	38	963	1 5
63	22	589	640	691	742	792	843	894	37	962	2 11
62	23	894	944	995	*045	*096	*146	*196	36	962	3 17
62	24	8.62 196	246	297	347	397	447	497	35	961	4 23
61	25	497	546	596	646	696	745	795	34	961	5 29
61	26	795	844	894	943	993	*042	*091	33	960	6 35
60	27	8.63 091	140	189	238	288	336	385	32	960	7 41
60	28	385	434	483	532	580	629	678	31	959	8 47
59	29	678	726	775	823	871	920	968	30	959	9 53
59	30	968	*016	*064	*112	*160	*208	*256	29	958	58
58	31	8.64 256	304	352	400	448	495	543	28	958	1 5
58	32	543	590	638	685	733	780	827	27	957	2 11
57	33	827	875	922	969	*016	*063	*110	26	956	3 17
56	34	8.65 110	157	204	251	298	344	391	25	956	4 23
56	35	391	438	484	531	577	624	670	24	955	5 29
55	36	670	717	763	809	855	901	947	23	955	6 34
55	37	947	994	*040	*085	*131	*177	*223	22	954	7 40
54	38	8.66 223	269	314	360	406	451	497	21	954	8 46
54	39	497	542	588	633	678	724	769	20	953	9 52
53	40	769	814	859	904	949	994	*039	19	952	57
52	41	8.67 039	084	129	174	219	263	308	18	952	1 5
52	42	308	353	397	442	486	531	575	17	951	2 11
51	43	575	619	664	708	752	796	841	16	951	3 17
51	44	841	885	929	973	*017	*060	*104	15	950	4 22
50	45	8.68 104	148	192	236	279	323	367	14	949	5 28
49	46	367	410	454	497	540	584	627	13	949	6 34
49	47	627	670	714	757	800	843	886	12	948	7 39
48	48	886	929	972	*015	*058	*101	*144	11	948	8 45
48	49	8.69 144	187	229	272	315	357	400	10	947	9 51
47	50	400	442	485	527	570	612	654	9	946	56
46	51	654	697	739	781	823	865	907	8	946	1 5
46	52	907	949	991	*033	*075	*117	*159	7	945	2 11
45	53	8.70 159	201	242	284	326	367	409	6	944	3 16
44	54	409	451	492	534	575	616	658	5	944	4 22
44	55	658	699	740	781	823	864	905	4	943	5 28
43	56	905	946	987	*028	*069	*110	*151	3	942	6 33
42	57	8.71 151	192	232	273	314	355	395	2	942	7 39
42	58	395	436	476	517	557	598	638	1	941	8 44
41	59	638	679	719	759	800	840	880	0	940	9 50
		60′	50′	40′	30′	20′	10′	0′	′	9·99	P

*177° 267° *357° 87° L Cos L Sin

	0′	30′	20′	30′	40′	50′	60′	
0	8.54 308	369	429	489	549	609	669	59
1	669	729	789	848	908	967	*027	58
2	8.55 027	086	145	205	264	323	382	57
3	382	441	499	558	617	675	734	56
4	734	792	850	909	967	*025	*083	55
5	8.56 083	141	199	256	314	372	429	54
6	429	487	544	601	659	716	773	53
7	773	830	887	944	*000	*057	*114	52
8	8.57 114	170	227	283	340	396	452	51
9	452	508	564	620	676	732	788	50
10	788	843	899	955	*010	*065	*121	49
11	8.58 121	176	231	286	341	396	451	48
12	451	506	561	616	670	725	779	47
13	779	834	888	943	997	*051	*105	46
14	8.59 105	159	213	267	321	375	428	45
15	428	482	536	589	642	696	749	44
16	749	802	856	909	962	*015	*068	43
17	8.60 068	121	173	226	279	331	384	42
18	384	436	489	541	593	646	698	41
19	698	750	802	854	906	958	*009	40
20	8.61 009	061	113	164	216	267	319	39
21	319	370	422	473	524	575	626	38
22	626	677	728	779	830	881	931	37
23	931	982	*033	*083	*134	*184	*234	36
24	8.62 234	285	335	385	435	485	535	35
25	535	585	635	685	735	784	834	34
26	834	884	933	983	*032	*081	*131	33
27	8.63 131	180	229	278	328	377	426	32
28	426	475	523	572	621	670	718	31
29	718	767	816	864	913	961	*009	30
30	8.64 009	058	106	154	202	250	298	29
31	298	346	394	442	490	538	585	28
32	585	633	681	728	776	823	870	27
33	870	918	965	*012	*060	*107	*154	26
34	8.65 154	201	248	295	342	388	435	25
35	435	482	529	575	622	668	715	24
36	715	761	808	854	900	947	993	23
37	993	*039	*085	*131	*177	*223	*269	22
38	8.66 269	315	361	406	452	498	543	21
39	543	589	634	680	725	771	816	20
40	816	861	906	952	997	*042	*087	19
41	8.67 087	132	177	222	267	312	356	18
42	356	401	446	490	535	579	624	17
43	624	668	713	757	801	846	890	16
44	890	934	978	*022	*066	*110	*154	15
45	8.68 154	198	242	286	330	373	417	14
46	417	461	504	548	592	635	678	13
47	678	722	765	808	852	895	938	12
48	938	981	*024	*067	*110	*153	*196	11
49	8.69 196	239	282	325	368	410	453	10
50	453	496	538	581	623	666	708	9
51	708	750	793	835	877	920	962	8
52	962	*004	*046	*088	*130	*172	*214	7
53	8.70 214	256	298	339	381	423	465	6
54	465	506	548	589	631	673	714	5
55	714	755	797	838	879	921	962	4
56	962	*003	*044	*085	*126	*167	*208	3
57	8.71 208	249	290	331	372	413	453	2
58	453	494	535	575	616	657	697	1
59	697	738	778	819	859	899	940	0
	60′	50′	40′	30′	20′	10′	0′	′

P P

	55	54	53
1	5.5	5.4	5.3
2	11.0	10.8	10.6
3	16.5	16.2	15.9
4	22.0	21.6	21.2
5	27.5	27.0	26.5
6	33.0	32.4	31.8
7	38.5	37.8	37.1
8	44.0	43.2	42.4
9	49.5	48.6	47.7

	52	51
1	5.2	5.1
2	10.4	10.2
3	15.6	15.3
4	20.8	20.4
5	26.0	25.5
6	31.2	30.6
7	36.4	35.7
8	41.6	40.8
9	46.8	45.9

	50	49	48
1	5.0	4.9	4.8
2	10.0	9.8	9.6
3	15.0	14.7	14.4
4	20.0	19.6	19.2
5	25.0	24.5	24.0
6	30.0	29.4	28.8
7	35.0	34.3	33.6
8	40.0	39.2	38.4
9	45.0	44.1	43.2

	47	46	45
1	4.7	4.6	4.5
2	9.4	9.2	9.0
3	14.1	13.8	13.5
4	18.8	18.4	18.0
5	23.5	23.0	22.5
6	28.2	27.6	27.0
7	32.9	32.2	31.5
8	37.6	36.8	36.0
9	42.3	41.4	40.5

	44	43
1	4.4	4.3
2	8.8	8.6
3	13.2	12.9
4	17.6	17.2
5	22.0	21.5
6	26.4	25.8
7	30.8	30.1
8	35.2	34.4
9	39.6	38.7

	42	41	40
1	4.2	4.1	4.0
2	8.4	8.2	8.0
3	12.6	12.3	12.0
4	16.8	16.4	16.0
5	21.0	20.5	20.0
6	25.2	24.6	24.0
7	29.4	28.7	28.0
8	33.6	32.8	32.0
9	37.8	36.9	36.0

P P

99	'	0″	10″	20″	30″	40″	50″	60″		
40	0	8.71 880	920	960	*000	*040	*080	*120	59	940
40	1	8.72 120	160	200	240	280	320	359	58	939
39	2	359	399	439	478	518	558	597	57	938
38	3	597	637	676	716	755	794	834	56	938
38	4	834	873	912	951	991	*030	*069	55	937
37	5	8.73 069	108	147	186	225	264	303	54	936
36	6	303	342	380	419	458	497	535	53	936
36	7	535	574	613	651	690	728	767	52	935
35	8	767	805	844	882	920	959	997	51	934
34	9	997	*035	*073	*112	*150	*188	*226	50	934
34	10	8.74 226	264	302	340	378	416	454	49	933
33	11	454	491	529	567	605	642	680	48	932
32	12	680	718	755	793	831	868	906	47	932
32	13	906	943	980	*018	*055	*092	*130	46	931
31	14	8.75 130	167	204	241	279	316	353	45	930
30	15	353	390	427	464	501	538	575	44	929
29	16	575	612	648	685	722	759	795	43	929
29	17	795	832	869	905	942	979	*015	42	928
28	18	8.76 015	052	088	125	161	197	234	41	927
27	19	234	270	306	343	379	415	451	40	926
26	20	451	487	523	559	595	631	667	39	926
26	21	667	703	739	775	811	847	883	38	925
25	22	883	919	954	990	*026	*061	*097	37	924
24	23	8.77 097	133	168	204	239	275	310	36	923
23	24	310	346	381	416	452	487	522	35	923
23	25	522	558	593	628	663	698	733	34	922
22	26	733	768	803	838	873	908	943	33	921
21	27	943	978	*013	*048	*083	*118	*152	32	920
20	28	8.78 152	187	222	257	291	326	360	31	920
20	29	360	395	430	464	499	533	568	30	919
19	30	568	602	636	671	705	739	774	29	918
18	31	774	808	842	876	910	945	979	28	917
17	32	979	*013	*047	*081	*115	*149	*183	27	917
17	33	8.79 183	217	251	284	318	352	386	26	916
16	34	386	420	453	487	521	555	588	25	915
15	35	588	622	655	689	722	756	789	24	914
14	36	789	823	856	890	923	956	990	23	913
13	37	990	*023	*056	*090	*123	*156	*189	22	913
13	38	8.80 189	222	255	289	322	355	388	21	912
12	39	388	421	454	487	519	552	585	20	911
11	40	585	618	651	684	716	749	782	19	910
10	41	782	815	847	880	913	945	978	18	909
09	42	978	*010	*043	*075	*108	*140	*173	17	909
09	43	8.81 173	205	237	270	302	334	367	16	908
08	44	367	399	431	463	496	528	560	15	907
07	45	560	592	624	656	688	720	752	14	906
06	46	752	784	816	848	880	912	944	13	905
05	47	944	975	*007	*039	*071	*103	*134	12	904
04	48	8.82 134	166	198	229	261	292	324	11	904
04	49	324	356	387	419	450	482	513	10	903
03	50	513	544	576	607	639	670	701	9	902
02	51	701	732	764	795	826	857	888	8	901
01	52	888	920	951	982	*013	*044	*075	7	900
00	53	8.83 075	106	137	168	199	230	261	6	899
899	54	261	292	322	353	384	415	446	5	898
898	55	446	476	507	538	568	599	630	4	898
898	56	630	660	691	721	752	783	813	3	897
897	57	813	844	874	904	935	965	996	2	896
896	58	996	*026	*056	*087	*117	*147	*177	1	895
895	59	8.84 177	208	238	268	298	328	358	0	894
		60″	50″	40″	30″	20″	10″	0″	'	9.99

*176° 266° *356° 86° L Cos L Sin

P	P
40	
1	4.0
2	8.0
3	12.0
4	16.0
5	20.0
6	24.0
7	28.0
8	32.0
9	36.0
38	
1	3.8
2	7.6
3	11.4
4	15.2
5	19.0
6	22.8
7	26.6
8	30.4
9	34.2
36	
1	3.6
2	7.2
3	10.8
4	14.4
5	18.0
6	21.6
7	25.2
8	28.8
9	32.4
35	
1	3.5
2	7.0
3	10.5
4	14.0
5	17.5
6	21.0
7	24.5
8	28.0
9	31.5
33	
1	3.3
2	6.6
3	9.9
4	13.2
5	16.5
6	19.8
7	23.1
8	26.4
9	29.7
31	
1	3.1
2	6.2
3	9.3
4	12.4
5	15.5
6	18.6
7	21.7
8	24.8
9	27.9

′	0°	10′	20′	30′	40′	50′	60′	
0	8.71 940	980	*020	*060	*100	*141	*181	59
1	8.72 181	221	261	301	341	380	420	58
2	420	460	500	540	579	619	659	57
3	659	698	738	777	817	856	896	56
4	896	935	975	*014	*053	*093	*132	55
5	8.73 132	171	210	249	288	327	366	54
6	366	405	444	483	522	561	600	53
7	600	638	677	716	754	793	832	52
8	832	870	909	947	986	*024	*063	51
9	8.74 063	101	139	178	216	254	292	50
10	292	330	369	407	445	483	521	49
11	521	559	597	634	672	710	748	48
12	748	786	823	861	899	936	974	47
13	974	*012	*049	*087	*124	*162	*199	46
14	8.75 199	236	274	311	348	385	423	45
15	423	460	497	534	571	608	645	44
16	645	682	719	756	793	830	867	43
17	867	904	940	977	*014	*051	*087	42
18	8.76 087	124	160	197	233	270	306	41
19	306	343	379	416	452	488	525	40
20	525	561	597	633	669	706	742	39
21	742	778	814	850	886	922	958	38
22	958	994	*030	*065	*101	*137	*173	37
23	8.77 173	208	244	280	315	351	387	36
24	387	422	458	493	529	564	600	35
25	600	635	670	706	741	776	811	34
26	811	847	882	917	952	987	*022	33
27	8.78 022	057	092	127	162	197	232	32
28	232	267	302	337	371	406	441	31
29	441	475	510	545	579	614	649	30
30	649	683	718	752	787	821	855	29
31	855	890	924	958	993	*027	*061	28
32	8.79 061	096	130	164	198	232	266	27
33	266	300	334	368	402	436	470	26
34	470	504	538	572	606	639	673	25
35	673	707	741	774	808	842	875	24
36	875	909	942	976	*009	*043	*076	23
37	8.80 076	110	143	177	210	243	277	22
38	277	310	343	376	409	443	476	21
39	476	509	542	575	608	641	674	20
40	674	707	740	773	806	839	872	19
41	872	905	937	970	*003	*036	*068	18
42	8.81 068	101	134	166	199	232	264	17
43	264	297	329	362	394	427	459	16
44	459	491	524	556	588	621	653	15
45	653	685	717	750	782	814	846	14
46	846	878	910	942	974	*006	*038	13
47	8.82 038	070	102	134	166	198	230	12
48	230	262	293	325	357	389	420	11
49	420	452	484	515	547	579	610	10
50	610	642	673	705	736	768	799	9
51	799	831	862	893	925	956	987	8
52	987	*019	*050	*081	*112	*144	*175	7
53	8.83 175	206	237	268	299	330	361	6
54	361	392	423	454	485	516	547	5
55	547	578	609	640	671	701	732	4
56	732	763	794	824	855	886	916	3
57	916	947	978	*008	*039	*069	*100	2
58	8.84 100	130	161	191	222	252	282	1
59	282	313	343	374	404	434	464	0
	60′	50′	40′	30′	20′	10′	0′	′

*176° 266° *356° 86° L Cot

P	P	
	41	40
1	4.1	4.0
2	8.2	8.0
3	12.3	12.0
4	16.4	16.0
5	20.5	20.0
6	24.6	24.0
7	28.7	28.0
8	32.8	32.0
9	36.9	36.0
	39	38
1	3.9	3.8
2	7.8	7.6
3	11.7	11.4
4	15.6	15.2
5	19.5	19.0
6	23.4	22.8
7	27.3	26.6
8	31.2	30.4
9	35.1	34.2
	37	36
1	3.7	3.6
2	7.4	7.2
3	11.1	10.8
4	14.8	14.4
5	18.5	18.0
6	22.2	21.6
7	25.9	25.2
8	29.6	28.8
9	33.3	32.4
	35	34
1	3.5	3.4
2	7.0	6.8
3	10.5	10.2
4	14.0	13.6
5	17.5	17.0
6	21.0	20.4
7	24.5	23.8
8	28.0	27.2
9	31.5	30.6
	33	32
1	3.3	3.2
2	6.6	6.4
3	9.9	9.6
4	13.2	12.8
5	16.5	16.0
6	19.8	19.2
7	23.1	22.4
8	26.4	25.6
9	29.7	28.8
	31	30
1	3.1	3.0
2	6.2	6.0
3	9.3	9.0
4	12.4	12.0
5	15.5	15.0
6	18.6	18.0
7	21.7	21.0
8	24.8	24.0
9	27.9	27.0

P P

′	0′	10′	20′	30′	40′	50′	60′		
0	8.84 358	389	419	449	479	509	539	59	893
1	539	569	599	629	659	688	718	58	892
2	718	748	778	808	838	867	897	57	891
3	897	927	957	986	*016	*045	*075	56	891
4	8.85 075	105	134	164	193	223	252	55	890
5	252	282	311	341	370	400	429	54	889
6	429	458	488	517	546	576	605	53	888
7	605	634	663	693	722	751	780	52	887
8	780	809	838	867	896	926	955	51	886
9	955	984	*013	*042	*070	*099	*128	50	885
10	8.86 128	157	186	215	244	273	301	49	884
11	301	330	359	388	416	445	474	48	883
12	474	502	531	560	588	617	645	47	882
13	645	674	703	731	760	788	816	46	881
14	816	845	873	902	930	958	987	45	880
15	987	*015	*043	*072	*100	*128	*156	44	879
16	8.87 156	185	213	241	269	297	325	43	879
17	325	354	382	410	438	466	494	42	878
18	494	522	550	578	606	634	661	41	877
19	661	689	717	745	773	801	829	40	876
20	829	856	884	912	940	967	995	39	875
21	995	*023	*050	*078	*106	*133	*161	38	874
22	8.88 161	188	216	243	271	298	326	37	873
23	326	353	381	408	436	463	490	36	872
24	490	518	545	572	600	627	654	35	871
25	654	681	709	736	763	790	817	34	870
26	817	845	872	899	926	953	980	33	869
27	980	*007	*034	*061	*088	*115	*142	32	868
28	8.89 142	169	196	223	250	277	304	31	867
29	304	330	357	384	411	438	464	30	866
30	464	491	518	545	571	598	625	29	865
31	625	651	678	704	731	758	784	28	864
32	784	811	837	864	890	917	943	27	863
33	943	970	996	*023	*049	*075	*102	26	862
34	8.90 102	128	154	181	207	233	260	25	861
35	260	286	312	338	364	391	417	24	860
36	417	443	469	495	521	548	574	23	859
37	574	600	626	652	678	704	730	22	858
38	730	756	782	808	834	859	885	21	857
39	885	911	937	963	989	*015	*040	20	856
40	8.91 040	066	092	118	143	169	195	19	855
41	195	221	246	272	298	323	349	18	854
42	349	374	400	426	451	477	502	17	853
43	502	528	553	579	604	630	655	16	852
44	655	680	706	731	757	782	807	15	851
45	807	833	858	883	909	934	959	14	850
46	959	984	*010	*035	*060	*085	*110	13	848
47	8.92 110	135	161	186	211	236	261	12	847
48	261	286	311	336	361	386	411	11	846
49	411	436	461	486	511	536	561	10	845
50	561	586	611	636	660	685	710	9	844
51	710	735	760	784	809	834	859	8	843
52	859	883	908	933	957	982	*007	7	842
53	8.93 007	031	056	081	105	130	154	6	841
54	154	179	203	228	253	277	301	5	840
55	301	326	350	375	399	424	448	4	839
56	448	472	497	521	546	570	594	3	838
57	594	619	643	667	691	716	740	2	837
58	740	764	788	812	837	861	885	1	836
59	885	909	933	957	981	*006	*030	0	834
	60′	50′	40′	30′	20′	10′	0′	′	9.99

P P

	31	3
1	3.1	3
2	6.2	6
3	9.3	9
4	12.4	12
5	15.5	15
6	18.6	18
7	21.7	21
8	24.8	24
9	27.9	27

	29	
1	2.9	
2	5.8	
3	8.7	
4	11.6	
5	14.5	
6	17.4	
7	20.3	
8	23.2	
9	26.1	

	28	2
1	2.8	2
2	5.6	5
3	8.4	8
4	11.2	10
5	14.0	13
6	16.8	16
7	19.6	18
8	22.4	21
9	25.2	24

	26	
1	2.6	
2	5.2	
3	7.8	
4	10.4	
5	13.0	
6	15.6	
7	18.2	
8	20.8	
9	23.4	

	25	2
1	2.5	2
2	5.0	4
3	7.5	7
4	10.0	9
5	12.5	12
6	15.0	14
7	17.5	16
8	20.0	19
9	22.5	21

P P

L Tan 4°

*94° 184° *274°

'	0'	10'	20'	30'	40'	50'	60'	'
0	8.84 464	495	525	555	585	615	646	59
1	646	676	706	736	766	796	826	58
2	826	856	886	916	946	976	*006	57
3	8.85 006	036	065	095	125	155	185	56
4	185	214	244	274	304	333	363	55
5	363	392	422	452	481	511	540	54
6	540	570	599	629	658	688	717	53
7	717	747	776	805	835	864	893	52
8	893	922	952	981	*010	*039	*069	51
9	8.86 069	098	127	156	185	214	243	50
10	243	272	301	330	359	388	417	49
11	417	447	475	504	533	562	591	48
12	591	619	648	677	706	734	763	47
13	763	792	821	849	878	907	935	46
14	935	964	992	*021	*049	*078	*106	45
15	8.87 106	135	163	192	220	249	277	44
16	277	305	334	362	390	419	447	43
17	447	475	503	532	560	588	616	42
18	616	644	673	701	729	757	785	41
19	785	813	841	869	897	925	953	40
20	953	981	*009	*037	*065	*092	*120	39
21	8.88 120	148	176	204	231	259	287	38
22	287	315	342	370	398	425	453	37
23	453	481	508	536	563	591	618	36
24	618	646	674	701	728	756	783	35
25	783	811	838	866	893	920	948	34
26	948	975	*002	*029	*057	*084	111	33
27	8.89 111	138	166	193	220	247	274	32
28	274	301	328	355	383	410	437	31
29	437	464	491	518	545	571	598	30
30	598	625	652	679	706	733	760	29
31	760	786	813	840	867	894	920	28
32	920	947	974	*000	*027	*054	*080	27
33	8.90 080	107	134	160	187	213	240	26
34	240	266	293	319	346	372	399	25
35	399	425	451	478	504	531	557	24
36	557	583	610	636	662	688	715	23
37	715	741	767	793	820	846	872	22
38	872	898	924	950	976	*002	*029	21
39	8.91 029	055	081	107	133	159	185	20
40	185	211	236	262	288	314	340	19
41	340	366	392	418	443	469	495	18
42	495	521	547	572	598	624	650	17
43	650	675	701	727	752	778	803	16
44	803	829	855	880	906	931	957	15
45	957	982	*008	*033	*059	*084	*110	14
46	8.92 110	135	160	186	211	237	262	13
47	262	287	313	338	363	388	414	12
48	414	439	464	489	515	540	565	11
49	565	590	615	640	665	691	716	10
50	716	741	766	791	816	841	866	9
51	866	891	916	941	966	991	*016	8
52	8.93 016	040	065	090	115	140	165	7
53	165	190	214	239	264	289	313	6
54	313	338	363	388	412	437	462	5
55	462	486	511	536	560	585	609	4
56	609	634	658	683	707	732	756	3
57	756	781	805	830	854	879	903	2
58	903	928	952	976	*001	*025	*049	1
59	8.94 049	074	098	122	147	171	195	0
	60'	50'	40'	30'	20'	10'	0'	'

P P		
	31	30
1	3.1	3.0
2	6.2	6.0
3	9.3	9.0
4	12.4	12.0
5	15.5	15.0
6	18.6	18.0
7	21.7	21.0
8	24.8	24.0
9	27.9	27.0

P P	29
1	2.9
2	5.8
3	8.7
4	11.6
5	14.5
6	17.4
7	20.3
8	23.2
9	26.1

P P	28	27
1	2.8	2.7
2	5.6	5.4
3	8.4	8.1
4	11.2	10.8
5	14.0	13.5
6	16.8	16.2
7	19.6	18.9
8	22.4	21.6
9	25.2	24.3

P P	26
1	2.6
2	5.2
3	7.8
4	10.4
5	13.0
6	15.6
7	18.2
8	20.8
9	23.4

P P	25	24
1	2.5	2.4
2	5.0	4.8
3	7.5	7.2
4	10.0	9.6
5	12.5	12.0
6	15.0	14.4
7	17.5	16.8
8	20.0	19.2
9	22.5	21.6

′	0″	10″	20″	30″	40″	50″	60″		
0	8.94 030	054	078	102	126	150	174	59	833
1	174	198	222	246	270	294	317	58	832
2	317	341	365	389	413	437	461	57	831
3	461	484	508	532	556	580	603	56	830
4	603	627	651	675	698	722	746	55	829
5	746	769	793	817	840	864	887	54	828
6	887	911	935	958	982	*005	*029	53	827
7	8.95 029	052	076	099	123	146	170	52	825
8	170	193	216	240	263	287	310	51	824
9	310	333	357	380	403	427	450	50	823
10	450	473	496	520	543	566	589	49	822
11	589	613	636	659	682	705	728	48	821
12	728	752	775	798	821	844	867	47	820
13	867	890	913	936	959	982	*005	46	819
14	8.96 005	028	051	074	097	120	143	45	817
15	143	166	189	212	234	257	280	44	816
16	280	303	326	349	371	394	417	43	815
17	417	440	462	485	508	531	553	42	814
18	553	576	599	621	644	667	689	41	813
19	689	712	735	757	780	802	825	40	812
20	825	847	870	892	915	937	960	39	810
21	960	982	*005	*027	*050	*072	*095	38	809
22	8.97 095	117	139	162	184	207	229	37	808
23	229	251	274	296	318	341	363	36	807
24	363	385	407	430	452	474	496	35	806
25	496	518	541	563	585	607	629	34	804
26	629	651	674	696	718	740	762	33	803
27	762	784	806	828	850	872	894	32	802
28	894	916	938	960	982	*004	*026	31	801
29	8.98 026	048	070	092	114	135	157	30	800
30	157	179	201	223	245	266	288	29	798
31	288	310	332	354	375	397	419	28	797
32	419	441	462	484	506	527	549	27	796
33	549	571	592	614	636	657	679	26	795
34	679	701	722	744	765	787	808	25	793
35	808	830	851	873	894	916	937	24	792
36	937	959	980	*002	*023	*045	*066	23	791
37	8.99 066	087	109	130	152	173	194	22	790
38	194	216	237	258	280	301	322	21	788
39	322	343	365	386	407	428	450	20	787
40	450	471	492	513	534	556	577	19	786
41	577	598	619	640	661	682	704	18	785
42	704	725	746	767	788	809	830	17	783
43	830	851	872	893	914	935	956	16	782
44	956	977	998	*019	*040	*061	*082	15	781
45	9.00 082	103	123	144	165	186	207	14	780
46	207	228	249	269	290	311	332	13	778
47	332	353	373	394	415	436	456	12	777
48	456	477	498	518	539	560	581	11	776
49	581	601	622	642	663	684	704	10	775
50	704	725	746	766	787	807	828	9	773
51	828	848	869	889	910	930	951	8	772
52	951	971	992	*012	*033	*053	*074	7	771
53	9.01 074	094	115	135	155	176	196	6	769
54	196	217	237	257	278	298	318	5	768
55	318	339	359	379	399	420	440	4	767
56	440	460	480	501	521	541	561	3	765
57	561	582	602	622	642	662	682	2	764
58	682	703	723	743	763	783	803	1	763
59	803	823	843	863	883	903	923	0	761
	60″	50″	40″	30″	20″	10″	0″	′	9.99

*174° 2[illegible] *276°

P	P
	24
1	2.4
2	4.8
3	7.2
4	9.6
5	12.0
6	14.4
7	16.8
8	19.2
9	21.6
	23
1	2.3
2	4.6
3	6.9
4	9.2
5	11.5
6	13.8
7	16.1
8	18.4
9	20.7
	22
1	2.2
2	4.4
3	6.6
4	8.8
5	11.0
6	13.2
7	15.4
8	17.6
9	19.8
	21
1	2.1
2	4.2
3	6.3
4	8.4
5	10.5
6	12.6
7	14.7
8	16.8
9	18.9
	20
1	2.0
2	4.0
3	6.0
4	8.0
5	10.0
6	12.0
7	14.0
8	16.0
9	18.0

′	0°	10′	20′	30′	40′	50′	60′	
0	8.94 195	219	244	268	292	316	340	59
1	340	365	389	413	437	461	485	58
2	485	509	533	557	581	606	630	57
3	630	654	678	702	725	749	773	56
4	773	797	821	845	869	893	917	55
5	917	941	964	988	*012	*036	*060	54
6	8.95 060	083	107	131	155	178	202	53
7	202	226	249	273	297	320	344	52
8	344	368	391	415	439	462	486	51
9	486	509	533	556	580	603	627	50
10	627	650	674	697	721	744	767	49
11	767	791	814	838	861	884	908	48
12	908	931	954	977	*001	*024	*047	47
13	8.96 047	071	094	117	140	163	187	46
14	187	210	233	256	279	302	325	45
15	325	349	372	395	418	441	464	44
16	464	487	510	533	556	579	602	43
17	602	625	648	671	694	717	739	42
18	739	762	785	808	831	854	877	41
19	877	899	922	945	968	991	*013	40
20	8.97 013	036	059	081	104	127	150	39
21	150	172	195	218	240	263	285	38
22	285	308	331	353	376	398	421	37
23	421	443	466	488	511	533	556	36
24	556	578	601	623	646	668	691	35
25	691	713	735	758	780	802	825	34
26	825	847	869	892	914	936	959	33
27	959	981	*003	*025	*048	*070	*092	32
28	8.98 092	114	136	159	181	203	225	31
29	225	247	269	291	314	336	358	30
30	358	380	402	424	446	468	490	29
31	490	512	534	556	578	600	622	28
32	622	644	666	687	709	731	753	27
33	753	775	797	819	841	862	884	26
34	884	906	928	950	971	993	*015	25
35	8.99 015	037	058	080	102	123	145	24
36	145	167	188	210	232	253	275	23
37	275	297	318	340	361	383	405	22
38	405	426	448	469	491	512	534	21
39	534	555	577	598	620	641	662	20
40	662	684	705	727	748	769	791	19
41	791	812	834	855	876	898	919	18
42	919	940	961	983	*004	*025	*046	17
43	9.00 046	068	089	110	131	153	174	16
44	174	195	216	237	258	280	301	15
45	301	322	343	364	385	406	427	14
46	427	448	469	490	511	532	553	13
47	553	574	595	616	637	658	679	12
48	679	700	721	742	763	784	805	11
49	805	826	846	867	888	909	930	10
50	930	951	971	992	*013	*034	*055	9
51	9.01 055	075	096	117	138	158	179	8
52	179	200	220	241	262	282	303	7
53	303	324	344	365	386	406	427	6
54	427	447	468	489	509	530	550	5
55	550	571	591	612	632	653	673	4
56	673	694	714	735	755	776	796	3
57	796	816	837	857	878	898	918	2
58	918	939	959	979	*000	*020	*040	1
59	9.02 040	061	081	101	121	142	162	0
	60′	50′	40′	30′	20′	10′	0′	

P	P
	25
1	2.5
2	5.0
3	7.5
4	10.0
5	12.5
6	15.0
7	17.5
8	20.0
9	22.5
	24
1	2.4
2	4.8
3	7.2
4	9.6
5	12.0
6	14.4
7	16.8
8	19.2
9	21.6
	23
1	2.3
2	4.6
3	6.9
4	9.2
5	11.5
6	13.8
7	16.1
8	18.4
9	20.7
	22
1	2.2
2	4.4
3	6.6
4	8.8
5	11.0
6	13.2
7	15.4
8	17.6
9	19.8
	21
1	2.1
2	4.2
3	6.3
4	8.4
5	10.5
6	12.6
7	14.7
8	16.8
9	18.9
	20
1	2.0
2	4.0
3	6.0
4	8.0
5	10.0
6	12.0
7	14.0
8	16.0
9	18.0

P	P

′	0°	10°	20°	30°	40°	50°	60°			P P
0	9.01 923	943	964	984	*004	*024	*043	59	760	
1	9.02 043	063	083	103	123	143	163	58	759	
2	163	183	203	223	243	263	283	57	757	
3	283	302	322	342	362	382	402	56	756	21
4	402	421	441	461	481	501	520	55	755	1 2.1
5	520	540	560	579	599	619	639	54	753	2 4.2
6	639	658	678	698	717	737	757	53	752	3 6.3
7	757	776	796	816	835	855	874	52	751	4 8.4
8	874	894	914	933	953	972	992	51	749	5 10.5
9	992	*011	*031	*050	*070	*089	*109	50	748	6 12.6
10	9.03 109	128	148	167	187	206	226	49	747	7 14.7
11	226	245	265	284	303	323	342	48	745	8 16.8
12	342	361	381	400	420	439	458	47	744	9 18.9
13	458	478	497	516	535	555	574	46	742	
14	574	593	613	632	651	670	690	45	741	20
15	690	709	728	747	766	786	805	44	740	1 2.0
16	805	824	843	862	881	901	920	43	738	2 4.0
17	920	939	958	977	996	*015	*034	42	737	3 6.0
18	9.04 034	053	072	091	110	129	149	41	736	4 8.0
19	149	168	187	206	225	244	262	40	734	5 10.0
20	262	281	300	319	338	357	376	39	733	6 12.0
21	376	395	414	433	452	471	490	38	731	7 14.0
22	490	508	527	546	565	584	603	37	730	8 16.0
23	603	621	640	659	678	697	715	36	728	9 18.0
24	715	734	753	772	790	809	828	35	727	
25	828	847	865	884	903	921	940	34	726	19
26	940	959	977	996	*015	*033	*052	33	724	1 1.9
27	9.05 052	071	089	108	126	145	164	32	723	2 3.8
28	164	182	201	219	238	256	275	31	721	3 5.7
29	275	293	312	330	349	367	386	30	720	4 7.6
30	386	404	423	441	460	478	497	29	718	5 9.5
31	497	515	533	552	570	589	607	28	717	6 11.4
32	607	625	644	662	681	699	717	27	716	7 13.3
33	717	736	754	772	791	809	827	26	714	8 15.2
34	827	845	864	882	900	918	937	25	713	9 17.1
35	937	955	973	991	*010	*028	*046	24	711	
36	9.06 046	064	082	101	119	137	155	23	710	18
37	155	173	191	210	228	246	264	22	708	1 1.8
38	264	282	300	318	336	354	372	21	707	2 3.6
39	372	390	408	426	445	463	481	20	705	3 5.4
40	481	499	517	535	553	571	589	19	704	4 7.2
41	589	606	624	642	660	678	696	18	702	5 9.0
42	696	714	732	750	768	786	804	17	701	6 10.8
43	804	821	839	857	875	893	911	16	699	7 12.6
44	911	929	946	964	982	*000	*018	15	698	8 14.4
45	9.07 018	035	053	071	089	106	124	14	696	9 16.2
46	124	142	160	177	195	213	231	13	695	
47	231	248	266	284	301	319	337	12	693	
48	337	354	372	390	407	425	442	11	692	17
49	442	460	478	495	513	530	548	10	690	1 1.7
50	548	566	583	601	618	636	653	9	689	2 3.4
51	653	671	688	706	723	741	758	8	687	3 5.1
52	758	776	793	811	828	846	863	7	686	4 6.8
53	863	881	898	915	933	950	968	6	684	5 8.5
54	968	985	*002	*020	*037	*055	*072	5	683	6 10.2
55	9.08 072	089	107	124	141	159	176	4	681	7 11.9
56	176	193	211	228	245	262	280	3	680	8 13.6
57	280	297	314	331	349	366	383	2	678	9 15.3
58	383	400	418	435	452	469	486	1	677	
59	486	504	521	538	555	572	589	0	675	
	60°	50°	40°	30°	20°	10°	0°	′	9.99	P P

TABLE OF THE LOGARITHMS

OF THE

TRIGONOMETRIC FUNCTIONS

FROM MINUTE TO MINUTE

L Sin	d	C S	C T	L Tan	c d	L Cot	L Cos	
−∞				−∞		∞	0.00 000	60
6.46 373	30103	5.31 443	5.31 443	6.46 373	30103	3.53 627	0.00 000	59
6.76 476	17609	5.31 443	5.31 443	6.76 476	17609	3.23 524	0.00 000	58
6.94 085	12494	5.31 443	5.31 443	6.94 085	12494	3.05 915	0.00 000	57
7.06 579	9691	5.31 443	5.31 442	7.06 579	9691	2.93 421	0.00 000	56
7.16 270	7918	5.31 443	5.31 442	7.16 270	7918	2.83 730	0.00 000	55
7.24 188	6694	5.31 443	5.31 442	7.24 188	6694	2.75 812	0.00 000	54
7.30 882	5800	5.31 443	5.31 442	7.30 882	5800	2.69 118	0.00 000	53
7.36 682	5115	5.31 443	5.31 442	7.36 682	5115	2.63 318	0.00 000	52
7.41 797	4576	5.31 443	5.31 442	7.41 797	4576	2.58 203	0.00 000	51
7.46 373	4139	5.31 443	5.31 442	7.46 373	4139	2.53 627	0.00 000	50
7.50 512	3779	5.31 443	5.31 442	7.50 512	3779	2.49 488	0.00 000	49
7.54 291	3476	5.31 443	5.31 442	7.54 291	3476	2.45 709	0.00 000	48
7.57 767	3218	5.31 443	5.31 442	7.57 767	3219	2.42 233	0.00 000	47
7.60 985	2997	5.31 443	5.31 442	7.60 986	2996	2.39 014	0.00 000	46
7.63 982	2802	5.31 443	5.31 442	7.63 982	2803	2.36 018	0.00 000	45
7.66 784	2633	5.31 443	5.31 442	7.66 785	2633	2.33 215	0.00 000	44
7.69 417	2483	5.31 443	5.31 442	7.69 418	2482	2.30 582	9.99 999	43
7.71 900	2348	5.31 443	5.31 442	7.71 900	2348	2.28 100	9.99 999	42
7.74 248	2227	5.31 443	5.31 442	7.74 248	2228	2.25 752	9.99 999	41
7.76 475	2119	5.31 443	5.31 442	7.76 476	2119	2.23 524	9.99 999	40
7.78 594	2021	5.31 443	5.31 442	7.78 595	2020	2.21 405	9.99 999	39
7.80 615	1930	5.31 443	5.31 442	7.80 615	1931	2.19 385	9.99 999	38
7.82 545	1848	5.31 443	5.31 442	7.82 546	1848	2.17 454	9.99 999	37
7.84 393	1773	5.31 443	5.31 442	7.84 394	1773	2.15 606	9.99 999	36
7.86 166	1704	5.31 443	5.31 442	7.86 167	1704	2.13 833	9.99 999	35
7.87 870	1639	5.31 443	5.31 442	7.87 871	1639	2.12 129	9.99 999	34
7.89 509	1579	5.31 443	5.31 442	7.89 510	1579	2.10 490	9.99 999	33
7.91 088	1524	5.31 443	5.31 442	7.91 089	1524	2.08 911	9.99 999	32
7.92 612	1472	5.31 443	5.31 441	7.92 613	1473	2.07 387	9.99 998	31
7.94 084	1424	5.31 443	5.31 441	7.94 086	1424	2.05 914	9.99 998	30
7.95 508	1379	5.31 443	5.31 441	7.95 510	1379	2.04 490	9.99 998	29
7.96 887	1336	5.31 443	5.31 441	7.96 889	1336	2.03 111	9.99 998	28
7.98 223	1297	5.31 443	5.31 441	7.98 225	1297	2.01 775	9.99 998	27
7.99 520	1259	5.31 443	5.31 441	7.99 522	1259	2.00 478	9.99 998	26
8.00 779	1223	5.31 443	5.31 441	8.00 781	1223	1.99 219	9.99 998	25
8.02 002	1190	5.31 443	5.31 441	8.02 004	1190	1.97 996	9.99 998	24
8.03 192	1158	5.31 443	5.31 441	8.03 194	1159	1.96 806	9.99 997	23
8.04 350	1128	5.31 443	5.31 441	8.04 353	1128	1.95 647	9.99 997	22
8.05 478	1100	5.31 443	5.31 441	8.05 481	1100	1.94 519	9.99 997	21
8.06 578	1072	5.31 443	5.31 441	8.06 581	1072	1.93 419	9.99 997	20
8.07 650	1046	5.31 444	5.31 440	8.07 653	1047	1.92 347	9.99 997	19
8.08 696	1022	5.31 444	5.31 440	8.08 700	1022	1.91 300	9.99 997	18
8.09 718	999	5.31 444	5.31 440	8.09 722	998	1.90 278	9.99 997	17
8.10 717	976	5.31 444	5.31 440	8.10 720	976	1.89 280	9.99 996	16
8.11 693	954	5.31 444	5.31 440	8.11 696	955	1.88 304	9.99 996	15
8.12 647	934	5.31 444	5.31 440	8.12 651	934	1.87 349	9.99 996	14
8.13 581	914	5.31 444	5.31 440	8.13 585	915	1.86 415	9.99 996	13
8.14 495	896	5.31 444	5.31 440	8.14 500	895	1.85 500	9.99 996	12
8.15 391	877	5.31 444	5.31 440	8.15 395	878	1.84 605	9.99 996	11
8.16 268	860	5.31 444	5.31 439	8.16 273	860	1.83 727	9.99 995	10
8.17 128	843	5.31 444	5.31 439	8.17 133	843	1.82 867	9.99 995	9
8.17 971	827	5.31 444	5.31 439	8.17 976	828	1.82 024	9.99 995	8
8.18 798	812	5.31 444	5.31 439	8.18 804	812	1.81 196	9.99 995	7
8.19 610	797	5.31 444	5.31 439	8.19 616	797	1.80 384	9.99 995	6
8.20 407	782	5.31 444	5.31 439	8.20 413	782	1.79 587	9.99 994	5
8.21 189	769	5.31 444	5.31 439	8.21 195	769	1.78 805	9.99 994	4
8.21 958	755	5.31 445	5.31 439	8.21 964	756	1.78 036	9.99 994	3
8.22 713	743	5.31 445	5.31 438	8.22 720	742	1.77 280	9.99 994	2
8.23 456	730	5.31 445	5.31 438	8.23 462	730	1.76 538	9.99 994	1
8.24 186		5.31 445	5.31 438	8.24 192		1.75 808	9.99 993	0
L Cos	d			L Cot	c d	L Tan	L Sin	

*179° 180° *270°

1°

*91° 181° *271°

′	′	L Sin	d	C S	C T	L Tan	c d	L Cot	L Cos	′
3600	0	8.24 186		5.31 445	5.31 438	8.24 192		1.75 808	9.99 993	60
3660	1	8.24 903	717	5.31 445	5.31 438	8.24 910	718	1.75 090	9.99 993	59
3720	2	8.25 609	706	5.31 445	5.31 438	8.25 616	706	1.74 384	9.99 993	58
3780	3	8.26 304	695	5.31 445	5.31 438	8.26 312	696	1.73 688	9.99 993	57
3840	4	8.26 988	684	5.31 445	5.31 437	8.26 996	684	1.73 004	9.99 992	56
3900	5	8.27 661	673	5.31 445	5.31 437	8.27 669	673	1.72 331	9.99 992	55
3960	6	8.28 324	663	5.31 445	5.31 437	8.28 332	663	1.71 668	9.99 992	54
4020	7	8.28 977	653	5.31 445	5.31 437	8.28 986	654	1.71 014	9.99 992	53
4080	8	8.29 621	644	5.31 445	5.31 437	8.29 629	643	1.70 371	9.99 992	52
4140	9	8.30 255	634	5.31 445	5.31 437	8.30 263	634	1.69 737	9.99 991	51
4200	10	8.30 879	624	5.31 446	5.31 437	8.30 888	625	1.69 112	9.99 991	50
4260	11	8.31 495	616	5.31 446	5.31 436	8.31 505	617	1.68 495	9.99 991	49
4320	12	8.32 103	608	5.31 446	5.31 436	8.32 112	607	1.67 888	9.99 990	48
4380	13	8.32 702	599	5.31 446	5.31 436	8.32 711	599	1.67 289	9.99 990	47
4440	14	8.33 292	590	5.31 446	5.31 436	8.33 302	591	1.66 698	9.99 990	46
4500	15	8.33 875	583	5.31 446	5.31 436	8.33 886	584	1.66 114	9.99 990	45
4560	16	8.34 450	575	5.31 446	5.31 435	8.34 461	575	1.65 539	9.99 989	44
4620	17	8.35 018	568	5.31 446	5.31 435	8.35 029	568	1.64 971	9.99 989	43
4680	18	8.35 578	560	5.31 446	5.31 435	8.35 590	561	1.64 410	9.99 989	42
4740	19	8.36 131	553	5.31 446	5.31 435	8.36 143	553	1.63 857	9.99 989	41
4800	20	8.36 678	547	5.31 446	5.31 435	8.36 689	546	1.63 311	9.99 988	40
4860	21	8.37 217	539	5.31 447	5.31 434	8.37 229	540	1.62 771	9.99 988	39
4920	22	8.37 750	533	5.31 447	5.31 434	8.37 762	533	1.62 238	9.99 988	38
4980	23	8.38 276	526	5.31 447	5.31 434	8.38 289	527	1.61 711	9.99 987	37
5040	24	8.38 796	520	5.31 447	5.31 434	8.38 809	520	1.61 191	9.99 987	36
5100	25	8.39 310	514	5.31 447	5.31 434	8.39 323	514	1.60 677	9.99 987	35
5160	26	8.39 818	508	5.31 447	5.31 433	8.39 832	509	1.60 168	9.99 986	34
5220	27	8.40 320	502	5.31 447	5.31 433	8.40 334	502	1.59 666	9.99 986	33
5280	28	8.40 816	496	5.31 447	5.31 433	8.40 830	496	1.59 170	9.99 986	32
5340	29	8.41 307	491	5.31 447	5.31 433	8.41 321	491	1.58 679	9.99 985	31
5400	30	8.41 792	485	5.31 447	5.31 433	8.41 807	486	1.58 193	9.99 985	30
5460	31	8.42 272	480	5.31 448	5.31 432	8.42 287	480	1.57 713	9.99 985	29
5520	32	8.42 746	474	5.31 448	5.31 432	8.42 762	475	1.57 238	9.99 984	28
5580	33	8.43 216	470	5.31 448	5.31 432	8.43 232	470	1.56 768	9.99 984	27
5640	34	8.43 680	464	5.31 448	5.31 432	8.43 696	464	1.56 304	9.99 984	26
5700	35	8.44 139	459	5.31 448	5.31 431	8.44 156	460	1.55 844	9.99 983	25
5760	36	8.44 594	455	5.31 448	5.31 431	8.44 611	455	1.55 389	9.99 983	24
5820	37	8.45 044	450	5.31 448	5.31 431	8.45 061	450	1.54 939	9.99 983	23
5880	38	8.45 489	445	5.31 448	5.31 431	8.45 507	446	1.54 493	9.99 982	22
5940	39	8.45 930	441	5.31 449	5.31 431	8.45 948	441	1.54 052	9.99 982	21
6000	40	8.46 366	436	5.31 449	5.31 430	8.46 385	437	1.53 615	9.99 982	20
6060	41	8.46 796	433	5.31 449	5.31 430	8.46 817	432	1.53 183	9.99 981	19
6120	42	8.47 226	427	5.31 449	5.31 430	8.47 245	428	1.52 755	9.99 981	18
6180	43	8.47 650	424	5.31 449	5.31 430	8.47 669	424	1.52 331	9.99 981	17
6240	44	8.48 069	419	5.31 449	5.31 429	8.48 089	420	1.51 911	9.99 980	16
6300	45	8.48 485	416	5.31 449	5.31 429	8.48 505	416	1.51 495	9.99 980	15
6360	46	8.48 896	411	5.31 449	5.31 429	8.48 917	412	1.51 083	9.99 979	14
6420	47	8.49 304	408	5.31 450	5.31 428	8.49 325	408	1.50 675	9.99 979	13
6480	48	8.49 708	404	5.31 450	5.31 428	8.49 729	404	1.50 271	9.99 979	12
6540	49	8.50 108	400	5.31 450	5.31 428	8.50 130	401	1.49 870	9.99 978	11
6600	50	8.50 504	396	5.31 450	5.31 428	8.50 527	397	1.49 473	9.99 978	10
6660	51	8.50 897	393	5.31 450	5.31 427	8.50 920	393	1.49 080	9.99 977	9
6720	52	8.51 287	390	5.31 450	5.31 427	8.51 310	390	1.48 690	9.99 977	8
6780	53	8.51 673	386	5.31 450	5.31 427	8.51 696	386	1.48 304	9.99 977	7
6840	54	8.52 055	382	5.31 450	5.31 427	8.52 079	383	1.47 921	9.99 976	6
6900	55	8.52 434	379	5.31 451	5.31 426	8.52 459	380	1.47 541	9.99 976	5
6960	56	8.52 810	376	5.31 451	5.31 426	8.52 835	376	1.47 165	9.99 975	4
7020	57	8.53 183	373	5.31 451	5.31 426	8.53 208	373	1.46 792	9.99 975	3
7080	58	8.53 552	369	5.31 451	5.31 425	8.53 578	370	1.46 422	9.99 974	2
7140	59	8.53 919	367	5.31 451	5.31 425	8.53 945	367	1.46 055	9.99 974	1
7200	60	8.54 282	363	5.31 451	5.31 425	8.54 308	363	1.45 692	9.99 974	0
		L Cos	d			L Cot	c d	L Tan	L Sin	′

2°

*92° 182° *272°

′		L Sin	d	C S	C T	L Tan	c d	L Cot	L Cos	
7200	0	8.54 282		5.31 451	5.31 425	8.54 308		1.45 692	9.99 974	60
7260	1	8.54 642	360	5.31 451	5.31 425	8.54 669	361	1.45 331	9.99 973	59
7320	2	8.54 999	357	5.31 452	5.31 424	8.55 027	358	1.44 973	9.99 973	58
7380	3	8.55 354	355	5.31 452	5.31 424	8.55 382	355	1.44 618	9.99 972	57
7440	4	8.55 705	351	5.31 452	5.31 424	8.55 734	352	1.44 266	9.99 972	56
7500	5	8.56 054	349	5.31 452	5.31 423	8.56 083	349	1.43 917	9.99 971	55
7560	6	8.56 400	346	5.31 452	5.31 423	8.56 429	346	1.43 571	9.99 971	54
7620	7	8.56 743	343	5.31 452	5.31 423	8.56 773	344	1.43 227	9.99 970	53
7680	8	8.57 084	341	5 31 453	5.31 422	8.57 114	341	1.42 886	9.99 970	52
7740	9	8.57 421	337	5.31 453	5.31 422	8.57 452	338	1.42 548	9.99 969	51
7800	10	8.57 757	336	5.31 453	5.31 422	8.57 788	336	1.42 212	9.99 969	50
7860	11	8.58 089	332	5.31 453	5.31 421	8.58 121	333	1.41 879	9.99 968	49
7920	12	8.58 419	330	5.31 453	5.31 421	8.58 451	330	1.41 549	9.99 968	48
7980	13	8.58 747	328	5.31 453	5.31 421	8.58 779	328	1.41 221	9.99 967	47
8040	14	8.59 072	325	5.31 454	5.31 421	8.59 105	326	1.40 895	9.99 967	46
8100	15	8.59 395	323	5.31 454	5.31 420	8.59 428	323	1.40 572	9.99 967	45
8160	16	8.59 715	320	5.31 454	5.31 420	8.59 749	321	1.40 251	9.99 966	44
8220	17	8.60 033	318	5.31 454	5.31 420	8.60 068	319	1.39 932	9.99 966	43
8280	18	8.60 349	316	5.31 454	5.31 419	8.60 384	316	1.39 616	9.99 965	42
8340	19	8.60 662	313	5.31 454	5.31 419	8.60 698	314	1.39 302	9.99 964	41
8400	20	8.60 973	311	5.31 455	5.31 418	8.61 009	311	1.38 991	9.99 964	40
8460	21	8.61 282	309	5.31 455	5.31 418	8.61 319	310	1.38 681	9.99 963	39
8520	22	8.61 589	307	5.31 455	5.31 418	8.61 626	307	1.38 374	9.99 963	38
8580	23	8.61 894	305	5.31 455	5.31 417	8.61 931	305	1.38 069	9.99 962	37
8640	24	8.62 196	302	5.31 455	5.31 417	8.62 234	303	1.37 766	9.99 962	36
8700	25	8.62 497	301	5.31 455	5.31 417	8.62 535	301	1.37 465	9.99 961	35
8760	26	8.62 795	298	5.31 456	5.31 416	8.62 834	299	1.37 166	9.99 961	34
8820	27	8.63 091	296	5.31 456	5.31 416	8.63 131	297	1.36 869	9.99 960	33
8880	28	8.63 385	294	5.31 456	5.31 416	8.63 426	295	1.36 574	9.99 960	32
8940	29	8.63 678	293	5.31 456	5.31 415	8.63 718	292	1.36 282	9.99 959	31
9000	30	8.63 968	290	5.31 456	5.31 415	8.64 009	291	1.35 991	9.99 959	30
9060	31	8.64 256	288	5.31 456	5.31 415	8.64 298	289	1.35 702	9.99 958	29
9120	32	8.64 543	287	5.31 457	5.31 414	8.64 585	287	1.35 415	9.99 958	28
9180	33	8.64 827	284	5.31 457	5.31 414	8.64 870	285	1.35 130	9.99 957	27
9240	34	8.65 110	283	5.31 457	5.31 413	8.65 154	284	1.34 846	9.99 956	26
9300	35	8.65 391	281	5.31 457	5.31 413	8.65 435	281	1.34 565	9.99 956	25
9360	36	8.65 670	279	5.31 457	5.31 413	8.65 715	280	1.34 285	9.99 955	24
9420	37	8.65 947	277	5.31 458	5.31 412	8.65 993	278	1.34 007	9.99 955	23
9480	38	8.66 223	276	5.31 458	5.31 412	8.66 269	276	1.33 731	9.99 954	22
9540	39	8.66 497	274	5.31 458	5.31 412	8.66 543	274	1.33 457	9.99 954	21
9600	40	8.66 769	272	5.31 458	5.31 411	8.66 816	273	1.33 184	9.99 953	20
9660	41	8.67 039	270	5.31 458	5.31 411	8.67 087	271	1.32 913	9.99 952	19
9720	42	8.67 308	269	5.31 459	5.31 410	8.67 356	269	1.32 644	9.99 952	18
9780	43	8.67 575	267	5.31 459	5.31 410	8.67 624	268	1.32 376	9.99 951	17
9840	44	8.67 841	266	5.31 459	5.31 410	8.67 890	266	1.32 110	9.99 951	16
9900	45	8.68 104	263	5.31 459	5.31 409	8.68 154	264	1.31 846	9.99 950	15
9960	46	8.68 367	263	5.31 459	5.31 409	8.68 417	263	1.31 583	9.99 949	14
10020	47	8.68 627	260	5.31 460	5.31 408	8.68 678	261	1.31 322	9.99 949	13
10080	48	8.68 886	259	5.31 460	5.31 408	8.68 938	260	1.31 062	9.99 948	12
10140	49	8.69 144	258	5.31 460	5.31 408	8.69 196	258	1.30 804	9.99 948	11
10200	50	8.69 400	256	5.31 460	5.31 407	8.69 453	257	1.30 547	9.99 947	10
10260	51	8.69 654	254	5.31 460	5.31 407	8.69 708	255	1.30 292	9.99 946	
10320	52	8.69 907	253	5.31 461	5.31 406	8.69 962	254	1.30 038	9.99 946	
10380	53	8.70 159	252	5.31 461	5.31 406	8.70 214	252	1.29 786	9.99 945	
10440	54	8.70 409	250	5.31 461	5.31 405	8.70 465	251	1.29 535	9.99 944	
10500	55	8.70 658	249	5.31 461	5.31 405	8.70 714	249	1.29 286	9.99 944	
10560	56	8.70 905	247	5.31 461	5.31 405	8.70 962	248	1.29 038	9.99 943	
10620	57	8.71 151	246	5.31 462	5.31 404	8.71 208	246	1.28 792	9.99 942	
10680	58	8.71 395	244	5.31 462	5.31 404	8.71 453	245	1.28 547	9.99 942	
10740	59	8.71 638	243	5.31 462	5.31 403	8.71 697	244	1.28 303	9.99 941	
10800	60	8.71 880	242	5.31 462	5.31 403	8.71 940	243	1.28 060	9.99 940	
		L Cos	d			L Cot	c d	L Tan	L Sin	

'	L Sin	d	L Tan	c d	L Cot	L Cos	
0	8.71 880	240	8.71 940	241	1.28 060	9.99 940	60
1	8.72 120	239	8.72 181	239	1.27 819	9.99 940	59
2	8.72 359	238	8.72 420	239	1.27 580	9.99 939	58
3	8.72 597	237	8.72 659	237	1.27 341	9.99 938	57
4	8.72 834	235	8.72 896	236	1.27 104	9.99 938	56
5	8.73 069	234	8.73 132	234	1.26 868	9.99 937	55
6	8.73 303	232	8.73 366	234	1.26 634	9.99 936	54
7	8.73 535	232	8.73 600	232	1.26 400	9.99 936	53
8	8.73 767	230	8.73 832	232	1.26 168	9.99 935	52
9	8.73 997	229	8.74 063	231	1.25 937	9.99 934	51
10	8.74 226	228	8.74 292	229	1.25 708	9.99 934	50
11	8.74 454	226	8.74 521	229	1.25 479	9.99 933	49
12	8.74 680	226	8.74 748	227	1.25 252	9.99 932	48
13	8.74 906	224	8.74 974	226	1.25 026	9.99 932	47
14	8.75 130	223	8.75 199	225	1.24 801	9.99 931	46
15	8.75 353	222	8.75 423	224	1.24 577	9.99 930	45
16	8.75 575	220	8.75 645	222	1.24 355	9.99 929	44
17	8.75 795	220	8.75 867	222	1.24 133	9.99 929	43
18	8.76 015	219	8.76 087	220	1.23 913	9.99 928	42
19	8.76 234	217	8.76 306	219	1.23 694	9.99 927	41
20	8.76 451	216	8.76 525	219	1.23 475	9.99 926	40
21	8.76 667	216	8.76 742	217	1.23 258	9.99 926	39
22	8.76 883	214	8.76 958	216	1.23 042	9.99 925	38
23	8.77 097	213	8.77 173	215	1.22 827	9.99 924	37
24	8.77 310	212	8.77 387	214	1.22 613	9.99 923	36
25	8.77 522	211	8.77 600	213	1.22 400	9.99 923	35
26	8.77 733	210	8.77 811	211	1.22 189	9.99 922	34
27	8.77 943	209	8.78 022	211	1.21 978	9.99 921	33
28	8.78 152	208	8.78 232	210	1.21 768	9.99 920	32
29	8.78 360	208	8.78 441	209	1.21 559	9.99 920	31
30	8.78 568	206	8.78 649	208	1.21 351	9.99 919	30
31	8.78 774	205	8.78 855	206	1.21 145	9.99 918	29
32	8.78 979	204	8.79 061	206	1.20 939	9.99 917	28
33	8.79 183	203	8.79 266	205	1.20 734	9.99 917	27
34	8.79 386	202	8.79 470	204	1.20 530	9.99 916	26
35	8.79 588	201	8.79 673	203	1.20 327	9.99 915	25
36	8.79 789	201	8.79 875	202	1.20 125	9.99 914	24
37	8.79 990	199	8.80 076	201	1.19 924	9.99 913	23
38	8.80 189	199	8.80 277	201	1.19 723	9.99 913	22
39	8.80 388	197	8.80 476	199	1.19 524	9.99 912	21
40	8.80 585	197	8.80 674	198	1.19 326	9.99 911	20
41	8.80 782	196	8.80 872	198	1.19 128	9.99 910	19
42	8.80 978	195	8.81 068	196	1.18 932	9.99 909	18
43	8.81 173	194	8.81 264	196	1.18 736	9.99 909	17
44	8.81 367	193	8.81 459	195	1.18 541	9.99 908	16
45	8.81 560	192	8.81 653	194	1.18 347	9.99 907	15
46	8.81 752	192	8.81 846	193	1.18 154	9.99 906	14
47	8.81 944	190	8.82 038	192	1.17 962	9.99 905	13
48	8.82 134	190	8.82 230	192	1.17 770	9.99 904	12
49	8.82 324	189	8.82 420	190	1.17 580	9.99 904	11
50	8.82 513	188	8.82 610	190	1.17 390	9.99 903	10
51	8.82 701	187	8.82 799	189	1.17 201	9.99 902	9
52	8.82 888	187	8.82 987	188	1.17 013	9.99 901	8
53	8.83 075	186	8.83 175	188	1.16 825	9.99 900	7
54	8.83 261	185	8.83 361	186	1.16 639	9.99 899	6
55	8.83 446	184	8.83 547	186	1.16 453	9.99 898	5
56	8.83 630	183	8.83 732	185	1.16 268	9.99 898	4
57	8.83 813	183	8.83 916	184	1.16 084	9.99 897	3
58	8.83 996	181	8.84 100	184	1.15 900	9.99 896	2
59	8.84 177	181	8.84 282	182	1.15 718	9.99 895	1
60	8.84 358		8.84 464		1.15 536	9.99 894	0
	L Cos	d	L Cot	c d	L Tan	L Sin	'

	P P				
	241	239	237	235	234
1	4.0	4.0	4.0	3.9	3.9
2	8.0	8.0	7.9	7.8	7.8
3	12.0	12.0	11.8	11.8	11.7
4	16.1	15.9	15.8	15.7	15.6
5	20.1	19.9	19.8	19.6	19.5
6	24.1	23.9	23.7	23.5	23.4
7	28.1	27.9	27.6	27.4	27.3
8	32.1	31.9	31.6	31.3	31.2
9	36.2	35.8	35.6	35.2	35.1
10	40.2	39.8	39.5	39.2	39.0
20	80.3	79.7	79.0	78.3	78.0
30	120.5	119.5	118.5	117.5	117.0
40	160.7	159.3	158.0	156.7	156.0
50	200.8	199.2	197.5	195.8	195.0
	232	229	227	225	223
1	3.9	3.8	3.8	3.8	3.7
2	7.7	7.6	7.6	7.5	7.4
3	11.6	11.4	11.4	11.2	11.2
4	15.5	15.3	15.1	15.0	14.9
5	19.3	19.1	18.9	18.8	18.6
6	23.2	22.9	22.7	22.5	22.3
7	27.1	26.7	26.5	26.2	26.0
8	30.9	30.5	30.3	30.0	29.7
9	34.8	34.4	34.0	33.8	33.4
10	38.7	38.2	37.8	37.5	37.2
20	77.3	76.3	75.7	75.0	74.3
30	116.0	114.5	113.5	112.5	111.5
40	154.7	152.7	151.3	150.0	148.7
50	193.3	190.8	189.2	187.5	185.8
	222	220	217	215	213
1	3.7	3.7	3.6	3.6	3.6
2	7.4	7.3	7.2	7.2	7.1
3	11.1	11.0	10.8	10.8	10.6
4	14.8	14.7	14.5	14.3	14.2
5	18.5	18.3	18.1	17.9	17.8
6	22.2	22.0	21.7	21.5	21.3
7	25.9	25.7	25.3	25.1	24.8
8	29.6	29.3	28.9	28.7	28.4
9	33.3	33.0	32.6	32.2	32.0
10	37.0	36.7	36.2	35.8	35.5
20	74.0	73.3	72.3	71.7	71.0
30	111.0	110.0	108.5	107.5	106.5
40	148.0	146.7	144.7	143.3	142.0
50	185.0	183.3	180.8	179.2	177.5
	211	208	206	203	201
1	3.5	3.5	3.4	3.4	3.4
2	7.0	6.9	6.9	6.8	6.7
3	10.6	10.4	10.3	10.2	10.0
4	14.1	13.9	13.7	13.5	13.4
5	17.6	17.3	17.2	16.9	16.8
6	21.1	20.8	20.6	20.3	20.1
7	24.6	24.3	24.0	23.7	23.4
8	28.1	27.7	27.5	27.1	26.8
9	31.6	31.2	30.9	30.4	30.2
10	35.2	34.7	34.3	33.8	33.5
20	70.3	69.3	68.7	67.7	67.0
30	105.5	104.0	103.0	101.5	100.5
40	140.7	138.7	137.3	135.3	134.0
50	175.8	173.3	171.7	169.2	167.5
	199	197	195	193	192
1	3.3	3.3	3.2	3.2	3.2
2	6.6	6.6	6.5	6.4	6.4
3	10.0	9.8	9.8	9.6	9.6
4	13.3	13.1	13.0	12.9	12.8
5	16.6	16.4	16.2	16.1	16.0
6	19.9	19.7	19.5	19.3	19.2
7	23.2	23.0	22.8	22.5	22.4
8	26.5	26.3	26.0	25.7	25.6
9	29.8	29.6	29.2	29.0	28.8
10	33.2	32.8	32.5	32.2	32.0
20	66.3	65.7	65.0	64.3	64.0
30	99.5	98.5	97.5	96.5	96.0
40	132.7	131.3	130.0	128.7	128.0
50	165.8	164.2	162.5	160.8	160.0
	189	187	185	183	181
1	3.2	3.1	3.1	3.0	3.0
2	6.3	6.2	6.2	6.1	6.0
3	9.4	9.4	9.2	9.2	9.0
4	12.6	12.5	12.3	12.2	12.1
5	15.8	15.6	15.4	15.2	15.1
6	18.9	18.7	18.5	18.3	18.1
7	22.0	21.8	21.6	21.4	21.1
8	25.2	24.9	24.7	24.4	24.1
9	28.4	28.0	27.8	27.4	27.2
10	31.5	31.2	30.8	30.5	30.2
20	63.0	62.3	61.7	61.0	60.3
30	94.5	93.5	92.5	91.5	90.5
40	126.0	124.7	123.3	122.0	120.7
50	157.5	155.8	154.2	152.5	150.8

′	L Sin	d	L Tan	c d	L Cot	L Cos	
0	8.84 358		8.84 464		1.15 536	9.99 894	60
		181		182			
1	8.84 539		8.84 646		1.15 354	9.99 893	59
2	8.84 718	179	8.84 826	180	1.15 174	9.99 892	58
3	8.84 897	179	8.85 006	180	1.14 994	9.99 891	57
		178		179			
4	8.85 075		8.85 185		1.14 815	9.99 891	56
5	8.85 252	177	8.85 363	178	1.14 637	9.99 890	55
6	8.85 429	177	8.85 540	177	1.14 460	9.99 889	54
		176		177			
7	8.85 605		8.85 717		1.14 283	9.99 888	53
8	8.85 780	175	8.85 893	176	1.14 107	9.99 887	52
9	8.85 955	175	8.86 069	176	1.13 931	9.99 886	51
10	8.86 128	173	8.86 243	174	1.13 757	9.99 885	50
11	8.86 301	173	8.86 417	174	1.13 583	9.99 884	49
12	8.86 474	173	8.86 591	174	1.13 409	9.99 883	48
13	8.86 645	171	8.86 763	172	1.13 237	9.99 882	47
		171		172			
14	8.86 816		8.86 935		1.13 065	9.99 881	46
15	8.86 987	171	8.87 106	171	1.12 894	9.99 880	45
16	8.87 156	169	8.87 277	171	1.12 723	9.99 879	44
		169		170			
17	8.87 325		8.87 447		1.12 553	9.99 879	43
18	8.87 494	169	8.87 616	169	1.12 384	9.99 878	42
19	8.87 661	167	8.87 785	169	1.12 215	9.99 877	41
20	8.87 829	168	8.87 953	168	1.12 047	9.99 876	40
21	8.87 995	166	8.88 120	167	1.11 880	9.99 875	39
22	8.88 161	166	8.88 287	167	1.11 713	9.99 874	38
23	8.88 326	165	8.88 453	166	1.11 547	9.99 873	37
		164		165			
24	8.88 490		8.88 618		1.11 382	9.99 872	36
25	8.88 654	164	8.88 783	165	1.11 217	9.99 871	35
26	8.88 817	163	8.88 948	165	1.11 052	9.99 870	34
		163		163			
27	8.88 980		8.89 111		1.10 889	9.99 869	33
28	8.89 142	162	8.89 274	163	1.10 726	9.99 868	32
29	8.89 304	162	8.89 437	163	1.10 563	9.99 867	31
		160		161			
30	8.89 464		8.89 598		1.10 402	9.99 866	30
		161		162			
31	8.89 625		8.89 760		1.10 240	9.99 865	29
32	8.89 784	159	8.89 920	160	1.10 080	9.99 864	28
33	8.89 943	159	8.90 080	160	1.09 920	9.99 863	27
		159		160			
34	8.90 102		8.90 240		1.09 760	9.99 862	26
35	8.90 260	158	8.90 399	159	1.09 601	9.99 861	25
36	8.90 417	157	8.90 557	158	1.09 443	9.99 860	24
		157		158			
37	8.90 574		8.90 715		1.09 285	9.99 859	23
38	8.90 730	156	8.90 872	157	1.09 128	9.99 858	22
39	8.90 885	155	8.91 029	157	1.08 971	9.99 857	21
40	8.91 040	155	8.91 185	156	1.08 815	9.99 856	20
41	8.91 195	155	8.91 340	155	1.08 660	9.99 855	19
42	8.91 349	154	8.91 495	155	1.08 505	9.99 854	18
43	8.91 502	153	8.91 650	155	1.08 350	9.99 853	17
		153		153			
44	8.91 655		8.91 803		1.08 197	9.99 852	16
45	8.91 807	152	8.91 957	154	1.08 043	9.99 851	15
46	8.91 959	152	8.92 110	153	1.07 890	9.99 850	14
		151		152			
47	8.92 110		8.92 262		1.07 738	9.99 848	13
48	8.92 261	151	8.92 414	152	1.07 586	9.99 847	12
49	8.92 411	150	8.92 565	151	1.07 435	9.99 846	11
50	8.92 561	150	8.92 716	151	1.07 284	9.99 845	10
51	8.92 710	149	8.92 866	150	1.07 134	9.99 844	9
52	8.92 859	149	8.93 016	150	1.06 984	9.99 843	8
53	8.93 007	148	8.93 165	149	1.06 835	9.99 842	7
		147		148			
54	8.93 154		8.93 313		1.06 687	9.99 841	6
55	8.93 301	147	8.93 462	149	1.06 538	9.99 840	5
56	8.93 448	147	8.93 609	147	1.06 391	9.99 839	4
		146		147			
57	8.93 594		8.93 756		1.06 244	9.99 838	3
58	8.93 740	146	8.93 903	147	1.06 097	9.99 837	2
59	8.93 885	145	8.94 049	146	1.05 951	9.99 836	1
		145		146			
60	8.94 030		8.94 195		1.05 805	9.99 834	0
	L Cos	d	L Cot	c d	L Tan	L Sin	′

	P	P	P	P	P
	182	181	179	178	177
1	3.0	3.0	3.0	3.0	3.0
2	6.1	6.0	6.0	5.9	5.9
3	9.1	9.0	9.0	8.9	8.8
4	12.1	12.1	11.9	11.9	11.8
5	15.2	15.1	14.9	14.8	14.8
6	18.2	18.1	17.9	17.8	17.7
7	21.2	21.1	20.9	20.8	20.6
8	24.3	24.1	23.9	23.7	23.6
9	27.3	27.2	26.8	26.7	26.6
10	30.3	30.2	29.8	29.7	29.5
20	60.7	60.3	59.7	59.3	59.0
30	91.0	90.5	89.5	89.0	88.5
40	121.3	120.7	119.3	118.7	118.0
50	151.7	150.8	149.2	148.3	147.5
	176	175	174	173	172
1	2.9	2.9	2.9	2.9	2.9
2	5.9	5.8	5.8	5.8	5.7
3	8.8	8.8	8.7	8.6	8.6
4	11.7	11.7	11.6	11.5	11.5
5	14.7	14.6	14.5	14.4	14.3
6	17.6	17.5	17.4	17.3	17.2
7	20.5	20.4	20.3	20.2	20.1
8	23.5	23.3	23.2	23.1	22.9
9	26.4	26.2	26.1	26.0	25.8
10	29.3	29.2	29.0	28.8	28.7
20	58.7	58.3	58.0	57.7	57.3
30	88.0	87.5	87.0	86.5	86.0
40	117.3	116.7	116.0	115.3	114.7
50	146.7	145.8	145.0	144.2	143.3
	171	170	169	168	167
1	2.8	2.8	2.8	2.8	2.8
2	5.7	5.7	5.6	5.6	5.6
3	8.6	8.5	8.4	8.4	8.4
4	11.4	11.3	11.3	11.2	11.1
5	14.2	14.2	14.1	14.0	13.9
6	17.1	17.0	16.9	16.8	16.7
7	20.0	19.8	19.7	19.6	19.5
8	22.8	22.7	22.5	22.4	22.3
9	25.6	25.5	25.4	25.2	25.0
10	28.5	28.3	28.2	28.0	27.8
20	57.0	56.7	56.3	56.0	55.7
30	85.5	85.0	84.5	84.0	83.5
40	114.0	113.3	112.7	112.0	111.3
50	142.5	141.7	140.8	140.0	139.2
	166	165	164	163	162
1	2.8	2.8	2.7	2.7	2.7
2	5.5	5.5	5.5	5.4	5.4
3	8.3	8.2	8.2	8.2	8.1
4	11.1	11.0	10.9	10.9	10.8
5	13.8	13.8	13.7	13.6	13.5
6	16.6	16.5	16.4	16.3	16.2
7	19.4	19.2	19.1	19.0	18.9
8	22.1	22.0	21.9	21.7	21.6
9	24.9	24.8	24.6	24.4	24.3
10	27.7	27.5	27.3	27.2	27.0
20	55.3	55.0	54.7	54.3	54.0
30	83.0	82.5	82.0	81.5	81.0
40	110.7	110.0	109.3	108.7	108.0
50	138.3	137.5	136.7	135.8	135.0
	161	160	159	158	157
1	2.7	2.7	2.6	2.6	2.6
2	5.4	5.3	5.3	5.3	5.2
3	8.1	8.0	8.0	7.9	7.8
4	10.7	10.7	10.6	10.5	10.5
5	13.4	13.3	13.2	13.2	13.1
6	16.1	16.0	15.9	15.8	15.7
7	18.8	18.7	18.6	18.4	18.3
8	21.5	21.3	21.2	21.1	20.9
9	24.2	24.0	23.8	23.7	23.6
10	26.8	26.7	26.5	26.3	26.2
20	53.7	53.3	53.0	52.7	52.3
30	80.5	80.0	79.5	79.0	78.5
40	107.3	106.7	106.0	105.3	104.7
50	134.2	133.3	132.5	131.7	130.8
	156	155	154	153	152
1	2.6	2.6	2.6	2.6	2.5
2	5.2	5.2	5.1	5.1	5.1
3	7.8	7.8	7.7	7.6	7.6
4	10.4	10.3	10.3	10.2	10.1
5	13.0	12.9	12.8	12.8	12.7
6	15.6	15.5	15.4	15.3	15.2
7	18.2	18.1	18.0	17.8	17.7
8	20.8	20.7	20.5	20.4	20.3
9	23.4	23.2	23.1	23.0	22.8
10	26.0	25.8	25.7	25.5	25.3
20	52.0	51.7	51.3	51.0	50.7
30	78.0	77.5	77.0	76.5	76.0
40	104.0	103.3	102.7	102.0	101.3
50	130.0	129.2	128.3	127.5	126.7

′	L Sin	d	L Tan	c d	L Cot	L Cos	
0	8.94 030		8.94 195		1.05 805	9.99 834	60
		144		145			
1	8.94 174	143	8.94 340	145	1.05 660	9.99 833	59
2	8.94 317	144	8.94 485	145	1.05 515	9.99 832	58
3	8.94 461	142	8.94 630	143	1.05 370	9.99 831	57
4	8.94 603	143	8.94 773	144	1.05 227	9.99 830	56
5	8.94 746	141	8.94 917	143	1.05 083	9.99 829	55
6	8.94 887	142	8.95 060	142	1.04 940	9.99 828	54
7	8.95 029	141	8.95 202	142	1.04 798	9.99 827	53
8	8.95 170	140	8.95 344	142	1.04 656	9.99 825	52
9	8.95 310	140	8.95 486	141	1.04 514	9.99 824	51
10	8.95 450	139	8.95 627	140	1.04 373	9.99 823	50
11	8.95 589	139	8.95 767	141	1.04 233	9.99 822	49
12	8.95 728	139	8.95 908	139	1.04 092	9.99 821	48
13	8.95 867	138	8.96 047	140	1.03 952	9.99 820	47
14	8.96 005	138	8.96 187	138	1.03 813	9.99 819	46
15	8.96 143	137	8.96 325	139	1.03 675	9.99 817	45
16	8.96 280	137	8.96 464	138	1.03 536	9.99 816	44
17	8.96 417	136	8.96 602	137	1.03 398	9.99 815	43
18	8.96 553	136	8.96 739	138	1.03 261	9.99 814	42
19	8.96 689	136	8.96 877	136	1.03 123	9.99 813	41
20	8.96 825	135	8.97 013	137	1.02 987	9.99 812	40
21	8.96 960	135	8.97 150	135	1.02 850	9.99 810	39
22	8.97 095	134	8.97 285	136	1.02 715	9.99 809	38
23	8.97 229	134	8.97 421	135	1.02 579	9.99 808	37
24	8.97 363	133	8.97 556	135	1.02 444	9.99 807	36
25	8.97 496	133	8.97 691	134	1.02 309	9.99 806	35
26	8.97 629	133	8.97 825	134	1.02 175	9.99 804	34
27	8.97 762	132	8.97 959	133	1.02 041	9.99 803	33
28	8.97 894	132	8.98 092	133	1.01 908	9.99 802	32
29	8.98 026	131	8.98 225	133	1.01 775	9.99 801	31
30	8.98 157	131	8.98 358	132	1.01 642	9.99 800	30
31	8.98 288	131	8.98 490	132	1.01 510	9.99 798	29
32	8.98 419	130	8.98 622	131	1.01 378	9.99 797	28
33	8.98 549	130	8.98 753	131	1.01 247	9.99 796	27
34	8.98 679	129	8.98 884	131	1.01 116	9.99 795	26
35	8.98 808	129	8.99 015	130	1.00 985	9.99 793	25
36	8.98 937	129	8.99 145	130	1.00 855	9.99 792	24
37	8.99 066	128	8.99 275	130	1.00 725	9.99 791	23
38	8.99 194	128	8.99 405	129	1.00 595	9.99 790	22
39	8.99 322	128	8.99 534	128	1.00 466	9.99 788	21
40	8.99 450	127	8.99 662	129	1.00 338	9.99 787	20
41	8.99 577	127	8.99 791	128	1.00 209	9.99 786	19
42	8.99 704	126	8.99 919	128	1.00 081	9.99 785	18
43	8.99 830	126	9.00 046	127	0.99 954	9.99 783	17
44	8.99 956	126	9.00 174	128	0.99 826	9.99 782	16
45	9.00 082	125	9.00 301	127	0.99 699	9.99 781	15
46	9.00 207	125	9.00 427	126	0.99 573	9.99 780	14
47	9.00 332	124	9.00 553	126	0.99 447	9.99 778	13
48	9.00 456	125	9.00 679	126	0.99 321	9.99 777	12
49	9.00 581	123	9.00 805	125	0.99 195	9.99 776	11
50	9.00 704	124	9.00 930	125	0.99 070	9.99 775	10
51	9.00 828	123	9.01 055	124	0.98 945	9.99 773	9
52	9.00 951	123	9.01 179	124	0.98 821	9.99 772	8
53	9.01 074	122	9.01 303	124	0.98 697	9.99 771	7
54	9.01 196	122	9.01 427	123	0.98 573	9.99 769	6
55	9.01 318	122	9.01 550	123	0.98 450	9.99 768	5
56	9.01 440	121	9.01 673	123	0.98 327	9.99 767	4
57	9.01 561	121	9.01 796	122	0.98 204	9.99 765	3
58	9.01 682	121	9.01 918	122	0.98 082	9.99 764	2
59	9.01 803	120	9.02 040	122	0.97 960	9.99 763	1
60	9.01 923		9.02 162		0.97 838	9.99 761	0
	L Cos	d	L Cot	c d	L Tan	L Sin	′

	P	P			
	151	149	148	147	146
1	2.5	2.5	2.5	2.4	2.4
2	5.0	5.0	4.9	4.9	4.9
3	7.6	7.4	7.4	7.4	7.3
4	10.1	9.9	9.9	9.8	9.7
5	12.6	12.4	12.3	12.2	12.2
6	15.1	14.9	14.8	14.7	14.6
7	17.6	17.4	17.3	17.2	17.0
8	20.1	19.9	19.7	19.6	19.5
9	22.6	22.4	22.2	22.0	21.9
10	25.2	24.8	24.7	24.5	24.3
20	50.3	49.7	49.3	49.0	48.7
30	75.5	74.5	74.0	73.5	73.0
40	100.7	99.3	98.7	98.0	97.3
50	125.8	124.2	123.3	122.5	121.7
	145	144	143	142	141
1	2.4	2.4	2.4	2.4	2.4
2	4.8	4.8	4.8	4.7	4.7
3	7.2	7.2	7.2	7.1	7.0
4	9.7	9.6	9.5	9.5	9.4
5	12.1	12.0	11.9	11.8	11.8
6	14.5	14.4	14.3	14.2	14.1
7	16.9	16.8	16.7	16.6	16.4
8	19.3	19.2	19.1	18.9	18.8
9	21.8	21.6	21.4	21.3	21.2
10	24.2	24.0	23.8	23.7	23.5
20	48.3	48.0	47.7	47.3	47.0
30	72.5	72.0	71.5	71.0	70.5
40	96.7	96.0	95.3	94.7	94.0
50	120.8	120.0	119.2	118.3	117.5
	140	139	138	137	136
1	2.3	2.3	2.3	2.3	2.3
2	4.7	4.6	4.6	4.6	4.5
3	7.0	7.0	6.9	6.8	6.8
4	9.3	9.3	9.2	9.1	9.1
5	11.7	11.6	11.5	11.4	11.3
6	14.0	13.9	13.8	13.7	13.6
7	16.3	16.2	16.1	16.0	15.9
8	18.7	18.5	18.4	18.3	18.1
9	21.0	20.8	20.7	20.6	20.4
10	23.3	23.2	23.0	22.8	22.7
20	46.7	46.3	46.0	45.7	45.3
30	70.0	69.5	69.0	68.5	68.0
40	93.3	92.7	92.0	91.3	90.7
50	116.7	115.8	115.0	114.2	113.3
	135	134	133	132	131
1	2.2	2.2	2.2	2.2	2.2
2	4.5	4.5	4.4	4.4	4.4
3	6.8	6.7	6.6	6.6	6.6
4	9.0	8.9	8.9	8.8	8.7
5	11.2	11.2	11.1	11.0	10.9
6	13.5	13.4	13.3	13.2	13.1
7	15.8	15.6	15.5	15.4	15.3
8	18.0	17.9	17.7	17.6	17.5
9	20.2	20.1	20.0	19.8	19.6
10	22.5	22.3	22.2	22.0	21.8
20	45.0	44.7	44.3	44.0	43.7
30	67.5	67.0	66.5	66.0	65.5
40	90.0	89.3	88.7	88.0	87.3
50	112.5	111.7	110.8	110.0	109.2
	130	129	128	127	126
1	2.2	2.2	2.1	2.1	2.1
2	4.3	4.3	4.3	4.2	4.2
3	6.5	6.4	6.4	6.4	6.3
4	8.7	8.6	8.5	8.5	8.4
5	10.8	10.8	10.7	10.6	10.5
6	13.0	12.9	12.8	12.7	12.6
7	15.2	15.0	14.9	14.8	14.7
8	17.3	17.2	17.1	16.9	16.8
9	19.5	19.4	19.2	19.0	18.9
10	21.7	21.5	21.3	21.2	21.0
20	43.3	43.0	42.7	42.3	42.0
30	65.0	64.5	64.0	63.5	63.0
40	86.7	86.0	85.3	84.7	84.0
50	108.3	107.5	106.7	105.8	105.0
	125	124	123	122	121
1	2.1	2.1	2.0	2.0	2.0
2	4.2	4.1	4.1	4.1	4.0
3	6.2	6.2	6.2	6.1	6.0
4	8.3	8.3	8.2	8.1	8.1
5	10.4	10.3	10.2	10.2	10.1
6	12.5	12.4	12.3	12.2	12.1
7	14.6	14.5	14.4	14.2	14.1
8	16.7	16.5	16.4	16.3	16.1
9	18.8	18.6	18.4	18.3	18.2
10	20.8	20.7	20.5	20.3	20.2
20	41.7	41.3	41.0	40.7	40.3
30	62.5	62.0	61.5	61.0	60.5
40	83.3	82.7	82.0	81.3	80.7
50	104.2	103.3	102.5	101.7	100.8

P	P

′	L Sin	d	L Tan	c d	L Cot	L Cos		P P
0	9.01 923		9.02 162		0.97 838	9.99 761	60	
		120		121				
1	9.02 043	120	9.02 283	121	0.97 717	9.99 760	59	
2	9.02 163	120	9.02 404	121	0.97 596	9.99 759	58	
3	9.02 283	119	9.02 525	120	0.97 475	9.99 757	57	
4	9.02 402	118	9.02 645	121	0.97 355	9.99 756	56	
5	9.02 520	119	9.02 766	119	0.97 234	9.99 755	55	
6	9.02 639	118	9.02 885	120	0.97 115	9.99 753	54	
7	9.02 757	117	9.03 005	119	0.96 995	9.99 752	53	
8	9.02 874	118	9.03 124	118	0.96 876	9.99 751	52	
9	9.02 992	117	9.03 242	119	0.96 758	9.99 749	51	
10	9.03 109	117	9.03 361	118	0.96 639	9.99 748	50	
11	9.03 226	116	9.03 479	118	0.96 521	9.99 747	49	
12	9.03 342	116	9.03 597	117	0.96 403	9.99 745	48	
13	9.03 458	116	9.03 714	118	0.96 286	9.99 744	47	
14	9.03 574	116	9.03 832	116	0.96 168	9.99 742	46	
15	9.03 690	115	9.03 948	117	0.96 052	9.99 741	45	
16	9.03 805	115	9.04 065	116	0.95 935	9.99 740	44	
17	9.03 920	114	9.04 181	116	0.95 819	9.99 738	43	
18	9.04 034	115	9.04 297	116	0.95 703	9.99 737	42	
19	9.04 149	113	9.04 413	115	0.95 587	9.99 736	41	
20	9.04 262	114	9.04 528	115	0.95 472	9.99 734	40	
21	9.04 376	114	9.04 643	115	0.95 357	9.99 733	39	
22	9.04 490	113	9.04 758	115	0.95 242	9.99 731	38	
23	9.04 603	112	9.04 873	114	0.95 127	9.99 730	37	
24	9.04 715	113	9.04 987	114	0.95 013	9.99 728	36	
25	9.04 828	112	9.05 101	113	0.94 899	9.99 727	35	
26	9.04 940	112	9.05 214	114	0.94 786	9.99 726	34	
27	9.05 052	112	9.05 328	113	0.94 672	9.99 724	33	
28	9.05 164	111	9.05 441	112	0.94 559	9.99 723	32	
29	9.05 275	111	9.05 553	113	0.94 447	9.99 721	31	
30	9.05 386	111	9.05 666	112	0.94 334	9.99 720	30	
31	9.05 497	110	9.05 778	112	0.94 222	9.99 718	29	
32	9.05 607	110	9.05 890	112	0.94 110	9.99 717	28	
33	9.05 717	110	9.06 002	111	0.93 998	9.99 716	27	
34	9.05 827	110	9.06 113	111	0.93 887	9.99 714	26	
35	9.05 937	109	9.06 224	111	0.93 776	9.99 713	25	
36	9.06 046	109	9.06 335	110	0.93 665	9.99 711	24	
37	9.06 155	109	9.06 445	111	0.93 555	9.99 710	23	
38	9.06 264	108	9.06 556	110	0.93 444	9.99 708	22	
39	9.06 372	109	9.06 666	109	0.93 334	9.99 707	21	
40	9.06 481	108	9.06 775	110	0.93 225	9.99 705	20	
41	9.06 589	107	9.06 885	109	0.93 115	9.99 704	19	
42	9.06 696	108	9.06 994	109	0.93 006	9.99 702	18	
43	9.06 804	107	9.07 103	108	0.92 897	9.99 701	17	
44	9.06 911	107	9.07 211	109	0.92 789	9.99 699	16	
45	9.07 018	106	9.07 320	108	0.92 680	9.99 698	15	
46	9.07 124	107	9.07 428	108	0.92 572	9.99 696	14	
47	9.07 231	106	9.07 536	107	0.92 464	9.99 695	13	
48	9.07 337	105	9.07 643	108	0.92 357	9.99 693	12	
49	9.07 442	106	9.07 751	107	0.92 249	9.99 692	11	
50	9.07 548	105	9.07 858	106	0.92 142	9.99 690	10	
51	9.07 653	105	9.07 964	107	0.92 036	9.99 689	9	
52	9.07 758	105	9.08 071	106	0.91 929	9.99 687	8	
53	9.07 863	105	9.08 177	106	0.91 823	9.99 686	7	
54	9.07 968	104	9.08 283	106	0.91 717	9.99 684	6	
55	9.08 072	104	9.08 389	106	0.91 611	9.99 683	5	
56	9.08 176	104	9.08 495	105	0.91 505	9.99 681	4	
57	9.08 280	103	9.08 600	105	0.91 400	9.99 680	3	
58	9.08 383	103	9.08 705	105	0.91 295	9.99 678	2	
59	9.08 486	103	9.08 810	104	0.91 190	9.99 677	1	
60	9.08 589		9.08 914		0.91 086	9.99 675	0	
	L Cos	d	L Cot	c d	L Tan	L Sin	′	P P

	121	120	119	118
1	2.0	2.0	2.0	2.0
2	4.0	4.0	4.0	3.9
3	6.0	6.0	6.0	5.9
4	8.1	8.0	7.9	7.9
5	10.1	10.0	9.9	9.8
6	12.1	12.0	11.9	11.8
7	14.1	14.0	13.9	13.8
8	16.1	16.0	15.9	15.7
9	18.2	18.0	17.8	17.7
10	20.2	20.0	19.8	19.7
20	40.3	40.0	39.7	39.3
30	60.5	60.0	59.5	59.0
40	80.7	80.0	79.3	78.7
50	100.8	100.0	99.2	98.3

	117	116	115	114
1	2.0	1.9	1.9	1.9
2	3.9	3.9	3.8	3.8
3	5.8	5.8	5.8	5.7
4	7.8	7.7	7.7	7.6
5	9.8	9.7	9.6	9.5
6	11.7	11.6	11.5	11.4
7	13.6	13.5	13.4	13.3
8	15.6	15.5	15.3	15.2
9	17.6	17.4	17.2	17.1
10	19.5	19.3	19.2	19.0
20	39.0	38.7	38.3	38.0
30	58.5	58.0	57.5	57.0
40	78.0	77.3	76.7	76.0
50	97.5	96.7	95.8	95.0

	113	112	111	110
1	1.9	1.9	1.8	1.8
2	3.8	3.7	3.7	3.7
3	5.6	5.6	5.6	5.5
4	7.5	7.5	7.4	7.3
5	9.4	9.3	9.2	9.2
6	11.3	11.2	11.1	11.0
7	13.2	13.1	13.0	12.8
8	15.1	14.9	14.8	14.7
9	17.0	16.8	16.6	16.5
10	18.8	18.7	18.5	18.3
20	37.7	37.3	37.0	36.7
30	56.5	56.0	55.5	55.0
40	75.3	74.7	74.0	73.3
50	94.2	93.3	92.5	91.7

	109	108	107	106
1	1.8	1.8	1.8	1.8
2	3.6	3.6	3.6	3.5
3	5.4	5.4	5.4	5.3
4	7.3	7.2	7.1	7.1
5	9.1	9.0	8.9	8.8
6	10.9	10.8	10.7	10.6
7	12.7	12.6	12.5	12.4
8	14.5	14.4	14.3	14.1
9	16.4	16.2	16.0	15.9
10	18.2	18.0	17.8	17.7
20	36.3	36.0	35.7	35.3
30	54.5	54.0	53.5	53.0
40	72.7	72.0	71.3	70.7
50	90.8	90.0	89.2	88.3

′	L Sin	d	L Tan	c d	L Cot	L Cos		P P
0	9.08 589	103	9.08 914	105	0.91 086	9.99 675	60	
1	9.08 692	103	9.09 019	104	0.90 981	9.99 674	59	
2	9.08 795	102	9.09 123	104	0.90 877	9.99 672	58	
3	9.08 897	102	9.09 227	103	0.90 773	9.99 670	57	
4	9.08 999	102	9.09 330	104	0.90 670	9.99 669	56	
5	9.09 101	101	9.09 434	103	0.90 566	9.99 667	55	
6	9.09 202	102	9.09 537	103	0.90 463	9.99 666	54	
7	9.09 304	101	9.09 640	102	0.90 360	9.99 664	53	
8	9.09 405	101	9.09 742	103	0.90 258	9.99 663	52	
9	9.09 506	100	9.09 845	102	0.90 155	9.99 661	51	
10	9.09 606	101	9.09 947	102	0.90 053	9.99 659	50	
11	9.09 707	100	9.10 049	101	0.89 951	9.99 658	49	
12	9.09 807	100	9.10 150	102	0.89 850	9.99 656	48	
13	9.09 907	99	9.10 252	101	0.89 748	9.99 655	47	
14	9.10 006	100	9.10 353	101	0.89 647	9.99 653	46	
15	9.10 106	99	9.10 454	101	0.89 546	9.99 651	45	
16	9.10 205	99	9.10 555	101	0.89 445	9.99 650	44	
17	9.10 304	98	9.10 656	100	0.89 344	9.99 648	43	
18	9.10 402	99	9.10 756	100	0.89 244	9.99 647	42	
19	9.10 501	98	9.10 856	100	0.89 144	9.99 645	41	
20	9.10 599	98	9.10 956	100	0.89 044	9.99 643	40	
21	9.10 697	98	9.11 056	99	0.88 944	9.99 642	39	
22	9.10 795	98	9.11 155	99	0.88 845	9.99 640	38	
23	9.10 893	97	9.11 254	99	0.88 746	9.99 638	37	
24	9.10 990	97	9.11 353	99	0.88 647	9.99 637	36	
25	9.11 087	97	9.11 452	99	0.88 548	9.99 635	35	
26	9.11 184	97	9.11 551	98	0.88 449	9.99 633	34	
27	9.11 281	96	9.11 649	98	0.88 351	9.99 632	33	
28	9.11 377	97	9.11 747	98	0.88 253	9.99 630	32	
29	9.11 474	96	9.11 845	98	0.88 155	9.99 629	31	
30	9.11 570	96	9.11 943	97	0.88 057	9.99 627	30	
31	9.11 666	95	9.12 040	98	0.87 960	9.99 625	29	
32	9.11 761	96	9.12 138	97	0.87 862	9.99 624	28	
33	9.11 857	95	9.12 235	97	0.87 765	9.99 622	27	
34	9.11 952	95	9.12 332	96	0.87 668	9.99 620	26	
35	9.12 047	95	9.12 428	97	0.87 572	9.99 618	25	
36	9.12 142	94	9.12 525	96	0.87 475	9.99 617	24	
37	9.12 236	95	9.12 621	96	0.87 379	9.99 615	23	
38	9.12 331	94	9.12 717	96	0.87 283	9.99 613	22	
39	9.12 425	94	9.12 813	96	0.87 187	9.99 612	21	
40	9.12 519	93	9.12 909	95	0.87 091	9.99 610	20	
41	9.12 612	94	9.13 004	95	0.86 996	9.99 608	19	
42	9.12 706	93	9.13 099	95	0.86 901	9.99 607	18	
43	9.12 799	93	9.13 194	95	0.86 806	9.99 605	17	
44	9.12 892	93	9.13 289	95	0.86 711	9.99 603	16	
45	9.12 985	93	9.13 384	95	0.86 616	9.99 601	15	
46	9.13 078	93	9.13 478	94	0.86 522	9.99 600	14	
47	9.13 171	93	9.13 573	95	0.86 427	9.99 598	13	
48	9.13 263	92	9.13 667	94	0.86 333	9.99 596	12	
49	9.13 355	92	9.13 761	94	0.86 239	9.99 595	11	
50	9.13 447	92	9.13 854	93	0.86 146	9.99 593	10	
51	9.13 539	92	9.13 948	94	0.86 052	9.99 591	9	
52	9.13 630	91	9.14 041	93	0.85 959	9.99 589	8	
53	9.13 722	92	9.14 134	93	0.85 866	9.99 588	7	
54	9.13 813	91	9.14 227	93	0.85 773	9.99 586	6	
55	9.13 904	91	9.14 320	93	0.85 680	9.99 584	5	
56	9.13 994	90	9.14 412	92	0.85 588	9.99 582	4	
57	9.14 085	91	9.14 504	92	0.85 496	9.99 581	3	
58	9.14 175	90	9.14 597	93	0.85 403	9.99 579	2	
59	9.14 266	91	9.14 688	91	0.85 312	9.99 577	1	
60	9.14 356	90	9.14 780	92	0.85 220	9.99 575	0	
	L Cos	d	L Cot	c d	L Tan	L Sin		P P

	105	104	103	102
1	1.8	1.7	1.7	1.7
2	3.5	3.5	3.4	3.4
3	5.2	5.2	5.2	5.1
4	7.0	6.9	6.9	6.8
5	8.8	8.7	8.6	8.5
6	10.5	10.4	10.3	10.2
7	12.2	12.1	12.0	11.9
8	14.0	13.9	13.7	13.6
9	15.8	15.6	15.4	15.3
10	17.5	17.3	17.2	17.0
20	35.0	34.7	34.3	34.0
30	52.5	52.0	51.5	51.0
40	70.0	69.3	68.7	68.0
50	87.5	86.7	85.8	85.0

	101	100	99	98
1	1.7	1.7	1.6	1.6
2	3.4	3.3	3.3	3.3
3	5.0	5.0	5.0	4.9
4	6.7	6.7	6.6	6.5
5	8.4	8.3	8.2	8.2
6	10.1	10.0	9.9	9.8
7	11.8	11.7	11.6	11.4
8	13.5	13.3	13.2	13.1
9	15.2	15.0	14.8	14.7
10	16.8	16.7	16.5	16.3
20	33.7	33.3	33.0	32.7
30	50.5	50.0	49.5	49.0
40	67.3	66.7	66.0	65.3
50	84.2	83.3	82.5	81.7

	97	96	95	94
1	1.6	1.6	1.6	1.6
2	3.2	3.2	3.2	3.1
3	4.8	4.8	4.8	4.7
4	6.5	6.4	6.3	6.3
5	8.1	8.0	7.9	7.8
6	9.7	9.6	9.5	9.4
7	11.3	11.2	11.1	11.0
8	12.9	12.8	12.7	12.5
9	14.6	14.4	14.2	14.1
10	16.2	16.0	15.8	15.7
20	32.3	32.0	31.7	31.3
30	48.5	48.0	47.5	47.0
40	64.7	64.0	63.3	62.7
50	80.8	80.0	79.2	78.3

	93	92	91	90
1	1.6	1.5	1.5	1.5
2	3.1	3.1	3.0	3.0
3	4.6	4.6	4.6	4.5
4	6.2	6.1	6.1	6.0
5	7.8	7.7	7.6	7.5
6	9.3	9.2	9.1	9.0
7	10.8	10.7	10.6	10.5
8	12.4	12.3	12.1	12.0
9	14.0	13.8	13.6	13.5
10	15.5	15.3	15.2	15.0
20	31.0	30.7	30.3	30.0
30	46.5	46.0	45.5	45.0
40	62.0	61.3	60.7	60.0
50	77.5	76.7	75.8	75.0

′	L Sin	d	L Tan	c d	L Cot	L Cos		′	P P
0	9.14 356		9.14 780		0.85 220	9.99 575	60		
		89		92					92 91 90
1	9.14 445		9.14 872		0.85 128	9.99 574	59	1	1.5 1.5 1.5
2	9.14 535	90	9.14 963	91	0.85 037	9.99 572	58	2	3.1 3.0 3.0
3	9.14 624	89	9.15 054	91	0.84 946	9.99 570	57	3	4.6 4.6 4.5
		90		91				4	6.1 6.1 6.0
4	9.14 714	89	9.15 145		0.84 855	9.99 568	56	5	7.7 7.6 7.5
5	9.14 803	88	9.15 236	91	0.84 764	9.99 566	55	6	9.2 9.1 9.0
6	9.14 891	89	9.15 327	90	0.84 673	9.99 565	54	7	10.7 10.6 10.5
7	9.14 980		9.15 417		0.84 583	9.99 563	53	8	12.3 12.1 12.0
8	9.15 069	89	9.15 508	91	0.84 492	9.99 561	52	9	13.8 13.6 13.5
9	9.15 157	88	9.15 598	90	0.84 402	9.99 559	51	10	15.3 15.2 15.0
10	9.15 245	88	9.15 688	90	0.84 312	9.99 557	50	20	30.7 30.3 30.0
11	9.15 333	88	9.15 777	89	0.84 223	9.99 556	49	30	46.0 45.5 45.0
12	9.15 421	88	9.15 867	90	0.84 133	9.99 554	48	40	61.3 60.7 60.0
13	9.15 508	87	9.15 956	89	0.84 044	9.99 552	47	50	76.7 75.8 75.0
		88		90					
14	9.15 596		9.16 046		0.83 954	9.99 550	46		89 88 87
15	9.15 683	87	9.16 135	89	0.83 865	9.99 548	45	1	1.5 1.5 1.4
16	9.15 770	87	9.16 224	89	0.83 776	9.99 546	44	2	3.0 2.9 2.9
17	9.15 857	87	9.16 312	88	0.83 688	9.99 545	43	3	4.4 4.4 4.4
18	9.15 944	86	9.16 401	89	0.83 599	9.99 543	42	4	5.9 5.9 5.8
19	9.16 030	86	9.16 489	88	0.83 511	9.99 541	41	5	7.4 7.3 7.2
20	9.16 116		9.16 577	88	0.83 423	9.99 539	40	6	8.9 8.8 8.7
21	9.16 203	87	9.16 665	88	0.83 335	9.99 537	39	7	10.4 10.3 10.2
22	9.16 289	86	9.16 753	88	0.83 247	9.99 535	38	8	11.9 11.7 11.6
23	9.16 374	85	9.16 841	87	0.83 159	9.99 533	37	9	13.4 13.2 13.0
24	9.16 460	86	9.16 928	88	0.83 072	9.99 532	36	10	14.8 14.7 14.5
25	9.16 545	85	9.17 016	87	0.82 984	9.99 530	35	20	29.7 29.3 29.0
26	9.16 631	86	9.17 103	87	0.82 897	9.99 528	34	30	44.5 44.0 43.5
27	9.16 716	85	9.17 190	87	0.82 810	9.99 526	33	40	59.3 58.7 58.0
28	9.16 801	85	9.17 277	86	0.82 723	9.99 524	32	50	74.2 73.3 72.5
29	9.16 886	84	9.17 363	87	0.82 637	9.99 522	31		
30	9.16 970	85	9.17 450	86	0.82 550	9.99 520	30		86 85 84
31	9.17 055	84	9.17 536	86	0.82 464	9.99 518	29	1	1.4 1.4 1.4
32	9.17 139	84	9.17 622	86	0.82 378	9.99 517	28	2	2.9 2.8 2.8
33	9.17 223	84	9.17 708	86	0.82 292	9.99 515	27	3	4.3 4.2 4.2
34	9.17 307	84	9.17 794	86	0.82 206	9.99 513	26	4	5.7 5.7 5.6
35	9.17 391	83	9.17 880	85	0.82 120	9.99 511	25	5	7.2 7.1 7.0
36	9.17 474	84	9.17 965	86	0.82 035	9.99 509	24	6	8.6 8.5 8.4
37	9.17 558	83	9.18 051	85	0.81 949	9.99 507	23	7	10.0 9.9 9.8
38	9.17 641	83	9.18 136	85	0.81 864	9.99 505	22	8	11.5 11.3 11.2
39	9.17 724	83	9.18 221	85	0.81 779	9.99 503	21	9	12.9 12.8 12.6
40	9.17 807	83	9.18 306	85	0.81 694	9.99 501	20	10	14.3 14.2 14.0
41	9.17 890	83	9.18 391	84	0.81 609	9.99 499	19	20	28.7 28.3 28.0
42	9.17 973	82	9.18 475	85	0.81 525	9.99 497	18	30	43.0 42.5 42.0
43	9.18 055	82	9.18 560	84	0.81 440	9.99 495	17	40	57.3 56.7 56.0
44	9.18 137	83	9.18 644	84	0.81 356	9.99 494	16	50	71.7 70.8 70.0
45	9.18 220	82	9.18 728	84	0.81 272	9.99 492	15		
46	9.18 302	81	9.18 812	84	0.81 188	9.99 490	14		83 82 81
47	9.18 383	82	9.18 896	83	0.81 104	9.99 488	13	1	1.4 1.4 1.4
48	9.18 465	82	9.18 979	84	0.81 021	9.99 486	12	2	2.8 2.7 2.7
49	9.18 547	81	9.19 063	83	0.80 937	9.99 484	11	3	4.2 4.1 4.0
50	9.18 628	81	9.19 146	83	0.80 854	9.99 482	10	4	5.5 5.5 5.4
51	9.18 709	81	9.19 229	83	0.80 771	9.99 480	9	5	6.9 6.8 6.8
52	9.18 790	81	9.19 312	83	0.80 688	9.99 478	8	6	8.3 8.2 8.1
53	9.18 871	81	9.19 395	83	0.80 605	9.99 476	7	7	9.7 9.6 9.4
54	9.18 952	81	9.19 478	83	0.80 522	9.99 474	6	8	11.1 10.9 10.8
55	9.19 033	80	9.19 561	82	0.80 439	9.99 472	5	9	12.4 12.3 12.2
56	9.19 113	80	9.19 643	82	0.80 357	9.99 470	4	10	13.8 13.7 13.5
57	9.19 193	80	9.19 725	82	0.80 275	9.99 468	3	20	27.7 27.3 27.0
58	9.19 273	80	9.19 807	82	0.80 193	9.99 466	2	30	41.5 41.0 40.5
59	9.19 353	80	9.19 889	82	0.80 111	9.99 464	1	40	55.3 54.7 54.0
60	9.19 433		9.19 971		0.80 029	9.99 462	0	50	69.2 68.3 67.5
	L Cos	d	L Cot	c d	L Tan	L Sin	′		P P

′	L Sin	d	L Tan	c d	L Cot	L Cos	
0	9.19 433		9.19 971		0.80 029	9.99 462	60
		80		82			
1	9.19 513		9.20 053		0.79 947	9.99 460	59
		79		81			
2	9.19 592		9.20 134		0.79 866	9.99 458	58
		80		82			
3	9.19 672		9.20 216		0.79 784	9.99 456	57
		79		81			
4	9.19 751		9.20 297		0.79 703	9.99 454	56
		79		81			
5	9.19 830		9.20 378		0.79 622	9.99 452	55
		79		81			
6	9.19 909		9.20 459		0.79 541	9.99 450	54
		79		81			
7	9.19 988		9.20 540		0.79 460	9.99 448	53
		79		81			
8	9.20 067		9.20 621		0.79 379	9.99 446	52
		78		80			
9	9.20 145		9.20 701		0.79 299	9.99 444	51
		78		81			
10	9.20 223		9.20 782		0.79 218	9.99 442	50
		79		80			
11	9.20 302		9.20 862		0.79 138	9.99 440	49
		78		80			
12	9.20 380		9.20 942		0.79 058	9.99 438	48
		78		80			
13	9.20 458		9.21 022		0.78 978	9.99 436	47
		77		80			
14	9.20 535		9.21 102		0.78 898	9.99 434	46
		78		80			
15	9.20 613		9.21 182		0.78 818	9.99 432	45
		78		79			
16	9.20 691		9.21 261		0.78 739	9.99 429	44
		77		80			
17	9.20 768		9.21 341		0.78 659	9.99 427	43
		77		79			
18	9.20 845		9.21 420		0.78 580	9.99 425	42
		77		79			
19	9.20 922		9.21 499		0.78 501	9.99 423	41
		77		79			
20	9.20 999		9.21 578		0.78 422	9.99 421	40
		77		79			
21	9.21 076		9.21 657		0.78 343	9.99 419	39
		77		79			
22	9.21 153		9.21 736		0.78 264	9.99 417	38
		76		78			
23	9.21 229		9.21 814		0.78 186	9.99 415	37
		77		79			
24	9.21 306		9.21 893		0.78 107	9.99 413	36
		76		78			
25	9.21 382		9.21 971		0.78 029	9.99 411	35
		76		78			
26	9.21 458		9.22 049		0.77 951	9.99 409	34
		76		78			
27	9.21 534		9.22 127		0.77 873	9.99 407	33
		76		78			
28	9.21 610		9.22 205		0.77 795	9.99 404	32
		75		78			
29	9.21 685		9.22 283		0.77 717	9.99 402	31
		76		78			
30	9.21 761		9.22 361		0.77 639	9.99 400	30
		75		77			
31	9.21 836		9.22 438		0.77 562	9.99 398	29
		76		78			
32	9.21 912		9.22 516		0.77 484	9.99 396	28
		75		77			
33	9.21 987		9.22 593		0.77 407	9.99 394	27
		75		77			
34	9.22 062		9.22 670		0.77 330	9.99 392	26
		75		77			
35	9.22 137		9.22 747		0.77 253	9.99 390	25
		74		77			
36	9.22 211		9.22 824		0.77 176	9.99 388	24
		75		77			
37	9.22 286		9.22 901		0.77 099	9.99 385	23
		75		76			
38	9.22 361		9.22 977		0.77 023	9.99 383	22
		74		77			
39	9.22 435		9.23 054		0.76 946	9.99 381	21
		74		76			
40	9.22 509		9.23 130		0.76 870	9.99 379	20
		74		76			
41	9.22 583		9.23 206		0.76 794	9.99 377	19
		74		77			
42	9.22 657		9.23 283		0.76 717	9.99 375	18
		74		76			
43	9.22 731		9.23 359		0.76 641	9.99 372	17
		74		76			
44	9.22 805		9.23 435		0.76 565	9.99 370	16
		73		75			
45	9.22 878		9.23 510		0.76 490	9.99 368	15
		74		76			
46	9.22 952		9.23 586		0.76 414	9.99 366	14
		73		75			
47	9.23 025		9.23 661		0.76 339	9.99 364	13
		73		76			
48	9.23 098		9.23 737		0.76 263	9.99 362	12
		73		75			
49	9.23 171		9.23 812		0.76 188	9.99 359	11
		73		75			
50	9.23 244		9.23 887		0.76 113	9.99 357	10
		73		75			
51	9.23 317		9.23 962		0.76 038	9.99 355	9
		73		75			
52	9.23 390		9.24 037		0.75 963	9.99 353	8
		72		75			
53	9.23 462		9.24 112		0.75 888	9.99 351	7
		73		74			
54	9.23 535		9.24 186		0.75 814	9.99 348	6
		72		75			
55	9.23 607		9.24 261		0.75 739	9.99 346	5
		72		74			
56	9.23 679		9.24 335		0.75 665	9.99 344	4
		73		75			
57	9.23 752		9.24 410		0.75 590	9.99 342	3
		71		74			
58	9.23 823		9.24 484		0.75 516	9.99 340	2
		72		74			
59	9.23 895		9.24 558		0.75 442	9.99 337	1
		72		74			
60	9.23 967		9.24 632		0.75 368	9.99 335	0
′	L Cos	d	L Cot	c d	L Tan	L Sin	′

P P

	80	79	78	77
1	1.3	1.3	1.3	1.3
2	2.7	2.6	2.6	2.6
3	4.0	4.0	3.9	3.8
4	5.3	5.3	5.2	5.1
5	6.7	6.6	6.5	6.4
6	8.0	7.9	7.8	7.7
7	9.3	9.2	9.1	9.0
8	10.7	10.5	10.4	10.3
9	12.0	11.8	11.7	11.6
10	13.3	13.2	13.0	12.8
20	26.7	26.3	26.0	25.7
30	40.0	39.5	39.0	38.5
40	53.3	52.7	52.0	51.3
50	66.7	65.8	65.0	64.2

	76	75	74	73
1	1.3	1.2	1.2	1.2
2	2.5	2.5	2.5	2.4
3	3.8	3.8	3.7	3.6
4	5.1	5.0	4.9	4.9
5	6.3	6.2	6.2	6.1
6	7.6	7.5	7.4	7.3
7	8.9	8.8	8.6	8.5
8	10.1	10.0	9.9	9.7
9	11.4	11.2	11.1	11.0
10	12.7	12.5	12.3	12.2
20	25.3	25.0	24.7	24.3
30	38.0	37.5	37.0	36.5
40	50.7	50.0	49.3	48.7
50	63.3	62.5	61.7	60.8

	72	71	3	2
1	1.2	1.2	0.0	0.0
2	2.4	2.4	0.1	0.1
3	3.6	3.6	0.2	0.1
4	4.8	4.7	0.2	0.1
5	6.0	5.9	0.2	0.2
6	7.2	7.1	0.3	0.2
7	8.4	8.3	0.4	0.2
8	9.6	9.5	0.4	0.3
9	10.8	10.6	0.4	0.3
10	12.0	11.8	0.5	0.3
20	24.0	23.7	1.0	0.7
30	36.0	35.5	1.5	1.0
40	48.0	47.3	2.0	1.3
50	60.0	59.2	2.5	1.7

	3/79	3/78	3/77
0			
1	13.2	13.0	12.8
2	39.5	39.0	38.5
3	65.8	65.0	64.2

	3/76	3/75	3/74
0			
1	12.7	12.5	12.3
2	38.0	37.5	37.0
3	63.3	62.5	61.7

P P

	L Sin	d	L Tan	c d	L Cot	L Cos	d	
0	9.23 967	72	9.24 632	74	0.75 368	9.99 335	2	60
1	9.24 039	71	9.24 706	73	0.75 294	9.99 333	2	59
2	9.24 110	71	9.24 779	74	0.75 221	9.99 331	3	58
3	9.24 181	72	9.24 853	73	0.75 147	9.99 328	2	57
4	9.24 253	71	9.24 926	74	0.75 074	9.99 326	2	56
5	9.24 324	71	9.25 000	73	0.75 000	9.99 324	2	55
6	9.24 395	71	9.25 073	73	0.74 927	9.99 322	3	54
7	9.24 466	70	9.25 146	73	0.74 854	9.99 319	2	53
8	9.24 536	71	9.25 219	73	0.74 781	9.99 317	2	52
9	9.24 607	70	9.25 292	73	0.74 708	9.99 315	2	51
10	9.24 677	71	9.25 365	72	0.74 635	9.99 313	3	50
11	9.24 748	70	9.25 437	73	0.74 563	9.99 310	2	49
12	9.24 818	70	9.25 510	72	0.74 490	9.99 308	2	48
13	9.24 888	70	9.25 582	73	0.74 418	9.99 306	2	47
14	9.24 958	70	9.25 655	72	0.74 345	9.99 304	3	46
15	9.25 028	70	9.25 727	72	0.74 273	9.99 301	2	45
16	9.25 098	70	9.25 799	72	0.74 201	9.99 299	2	44
17	9.25 168	69	9.25 871	72	0.74 129	9.99 297	3	43
18	9.25 237	70	9.25 943	72	0.74 057	9.99 294	2	42
19	9.25 307	69	9.26 015	71	0.73 985	9.99 292	2	41
20	9.25 376	69	9.26 086	72	0.73 914	9.99 290	2	40
21	9.25 445	69	9.26 158	71	0.73 842	9.99 288	3	39
22	9.25 514	69	9.26 229	72	0.73 771	9.99 285	2	38
23	9.25 583	69	9.26 301	71	0.73 699	9.99 283	2	37
24	9.25 652	69	9.26 372	71	0.73 628	9.99 281	3	36
25	9.25 721	69	9.26 443	71	0.73 557	9.99 278	2	35
26	9.25 790	68	9.26 514	71	0.73 486	9.99 276	2	34
27	9.25 858	69	9.26 585	70	0.73 415	9.99 274	3	33
28	9.25 927	68	9.26 655	71	0.73 345	9.99 271	2	32
29	9.25 995	68	9.26 726	71	0.73 274	9.99 269	2	31
30	9.26 063	68	9.26 797	70	0.73 203	9.99 267	3	30
31	9.26 131	68	9.26 867	70	0.73 133	9.99 264	2	29
32	9.26 199	68	9.26 937	71	0.73 063	9.99 262	2	28
33	9.26 267	68	9.27 008	70	0.72 992	9.99 260	3	27
34	9.26 335	68	9.27 078	70	0.72 922	9.99 257	2	26
35	9.26 403	67	9.27 148	70	0.72 852	9.99 255	3	25
36	9.26 470	68	9.27 218	70	0.72 782	9.99 252	2	24
37	9.26 538	67	9.27 288	69	0.72 712	9.99 250	2	23
38	9.26 605	67	9.27 357	70	0.72 643	9.99 248	3	22
39	9.26 672	67	9.27 427	69	0.72 573	9.99 245	2	21
40	9.26 739	67	9.27 496	70	0.72 504	9.99 243	2	20
41	9.26 806	67	9.27 566	69	0.72 434	9.99 241	3	19
42	9.26 873	67	9.27 635	69	0.72 365	9.99 238	2	18
43	9.26 940	67	9.27 704	69	0.72 296	9.99 236	3	17
44	9.27 007	66	9.27 773	69	0.72 227	9.99 233	2	16
45	9.27 073	67	9.27 842	69	0.72 158	9.99 231	2	15
46	9.27 140	66	9.27 911	69	0.72 089	9.99 229	3	14
47	9.27 206	67	9.27 980	69	0.72 020	9.99 226	2	13
48	9.27 273	66	9.28 049	68	0.71 951	9.99 224	3	12
49	9.27 339	66	9.28 117	69	0.71 883	9.99 221	2	11
50	9.27 405	66	9.28 186	68	0.71 814	9.99 219	2	10
51	9.27 471	66	9.28 254	69	0.71 746	9.99 217	3	9
52	9.27 537	65	9.28 323	68	0.71 677	9.99 214	2	8
53	9.27 602	66	9.28 391	68	0.71 609	9.99 212	3	7
54	9.27 668	66	9.28 459	68	0.71 541	9.99 209	2	6
55	9.27 734	65	9.28 527	68	0.71 473	9.99 207	3	5
56	9.27 799	65	9.28 595	67	0.71 405	9.99 204	2	4
57	9.27 864	66	9.28 662	68	0.71 338	9.99 202	2	3
58	9.27 930	65	9.28 730	68	0.71 270	9.99 200	3	2
59	9.27 995	65	9.28 798	67	0.71 202	9.99 197	2	1
60	9.28 060		9.28 865		0.71 135	9.99 195		0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	′

P	P		
	74	73	72
1	12.3	12.2	12.0
2	24.7	24.3	24.0
3	37.0	36.5	36.0
4	49.3	48.7	48.0
5	61.7	60.8	60.0
	71	70	69
1	11.8	11.7	11.5
2	23.7	23.3	23.0
3	35.5	35.0	34.5
4	47.3	46.7	46.0
5	59.2	58.3	57.5
	68	67	66
1	11.3	11.2	11.0
2	22.7	22.3	22.0
3	34.0	33.5	33.0
4	45.3	44.7	44.0
5	56.7	55.8	55.0

	3/74	3/73	3/72
0			
1	12.3	12.2	12.0
2	37.0	36.5	36.0
3	61.7	60.8	60.0

	3/71	3/70	3/69	3/68
0				
1	11.8	11.7	11.5	11.3
2	35.5	35.0	34.5	34.0
3	59.2	58.3	57.5	56.7

'	L Sin	d	L Tan	c d	L Cot	L Cos	d	'
0	9.28 060	65	9.28 865	68	0.71 135	9.99 195	3	60
1	9.28 125	65	9.28 933	67	0.71 067	9.99 192	2	59
2	9.28 190	64	9.29 000	67	0.71 000	9.99 190	3	58
3	9.28 254	65	9.29 067	67	0.70 933	9.99 187	2	57
4	9.28 319	65	9.29 134	67	0.70 866	9.99 185	3	56
5	9.28 384	64	9.29 201	67	0.70 799	9.99 182	2	55
6	9.28 448	64	9.29 268	67	0.70 732	9.99 180	3	54
7	9.28 512	65	9.29 335	67	0.70 665	9.99 177	2	53
8	9.28 577	64	9.29 402	66	0.70 598	9.99 175	3	52
9	9.28 641	64	9.29 468	67	0.70 532	9.99 172	2	51
10	9.28 705	64	9.29 535	66	0.70 465	9.99 170	3	50
11	9.28 769	64	9.29 601	67	0.70 399	9.99 167	2	49
12	9.28 833	63	9.29 668	66	0.70 332	9.99 165	3	48
13	9.28 896	64	9.29 734	66	0.70 266	9.99 162	2	47
14	9.28 960	64	9.29 800	66	0.70 200	9.99 160	3	46
15	9.29 024	63	9.29 866	66	0.70 134	9.99 157	2	45
16	9.29 087	63	9.29 932	66	0.70 068	9.99 155	3	44
17	9.29 150	64	9.29 998	66	0.70 002	9.99 152	2	43
18	9.29 214	63	9.30 064	66	0.69 936	9.99 150	3	42
19	9.29 277	63	9.30 130	65	0.69 870	9.99 147	2	41
20	9.29 340	63	9.30 195	66	0.69 805	9.99 145	3	40
21	9.29 403	63	9.30 261	66	0.69 739	9.99 142	2	39
22	9.29 466	63	9.30 326	65	0.69 674	9.99 140	3	38
23	9.29 529	62	9.30 391	66	0.69 609	9.99 137	2	37
24	9.29 591	63	9.30 457	65	0.69 543	9.99 135	3	36
25	9.29 654	62	9.30 522	65	0.69 478	9.99 132	2	35
26	9.29 716	63	9.30 587	65	0.69 413	9.99 130	3	34
27	9.29 779	62	9.30 652	65	0.69 348	9.99 127	3	33
28	9.29 841	62	9.30 717	65	0.69 283	9.99 124	2	32
29	9.29 903	63	9.30 782	64	0.69 218	9.99 122	3	31
30	9.29 966	62	9.30 846	65	0.69 154	9.99 119	2	30
31	9.30 028	62	9.30 911	64	0.69 089	9.99 117	3	29
32	9.30 090	61	9.30 975	65	0.69 025	9.99 114	2	28
33	9.30 151	62	9.31 040	64	0.68 960	9.99 112	3	27
34	9.30 213	62	9.31 104	64	0.68 896	9.99 109	3	26
35	9.30 275	61	9.31 168	65	0.68 832	9.99 106	2	25
36	9.30 336	62	9.31 233	64	0.68 767	9.99 104	3	24
37	9.30 398	61	9.31 297	64	0.68 703	9.99 101	2	23
38	9.30 459	62	9.31 361	64	0.68 639	9.99 099	3	22
39	9.30 521	61	9.31 425	64	0.68 575	9.99 096	3	21
40	9.30 582	61	9.31 489	63	0.68 511	9.99 093	2	20
41	9.30 643	61	9.31 552	64	0.68 448	9.99 091	3	19
42	9.30 704	61	9.31 616	63	0.68 384	9.99 088	2	18
43	9.30 765	61	9.31 679	64	0.68 321	9.99 086	3	17
44	9.30 826	61	9.31 743	63	0.68 257	9.99 083	3	16
45	9.30 887	60	9.31 806	64	0.68 194	9.99 080	2	15
46	9.30 947	61	9.31 870	63	0.68 130	9.99 078	3	14
47	9.31 008	60	9.31 933	63	0.68 067	9.99 075	3	13
48	9.31 068	61	9.31 996	63	0.68 004	9.99 072	2	12
49	9.31 129	60	9.32 059	63	0.67 941	9.99 070	3	11
50	9.31 189	61	9.32 122	63	0.67 878	9.99 067	3	10
51	9.31 250	60	9.32 185	63	0.67 815	9.99 064	2	9
52	9.31 310	60	9.32 248	63	0.67 752	9.99 062	3	8
53	9.31 370	60	9.32 311	62	0.67 689	9.99 059	3	7
54	9.31 430	60	9.32 373	63	0.67 627	9.99 056	2	6
55	9.31 490	59	9.32 436	62	0.67 564	9.99 054	3	5
56	9.31 549	60	9.32 498	63	0.67 502	9.99 051	3	4
57	9.31 609	60	9.32 561	62	0.67 439	9.99 048	2	3
58	9.31 669	59	9.32 623	62	0.67 377	9.99 046	3	2
59	9.31 728	60	9.32 685	62	0.67 315	9.99 043	3	1
60	9.31 788		9.32 747		0.67 253	9.99 040		0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	'

P	P		
	65	64	63
1	1.1	1.1	1.0
2	2.2	2.1	2.1
3	3.2	3.2	3.2
4	4.3	4.3	4.2
5	5.4	5.3	5.2
6	6.5	6.4	6.3
7	7.6	7.5	7.4
8	8.7	8.5	8.4
9	9.8	9.6	9.4
10	10.8	10.7	10.5
20	21.7	21.3	21.0
30	32.5	32.0	31.5
40	43.3	42.7	42.0
50	54.2	53.3	52.5
	62	61	60
1	1.0	1.0	1.0
2	2.1	2.0	2.0
3	3.1	3.0	3.0
4	4.1	4.1	4.0
5	5.2	5.1	5.0
6	6.2	6.1	6.0
7	7.2	7.1	7.0
8	8.3	8.1	8.0
9	9.3	9.2	9.0
10	10.3	10.2	10.0
20	20.7	20.3	20.0
30	31.0	30.5	30.0
40	41.3	40.7	40.0
50	51.7	50.8	50.0
	59	3	2
1	1.0	0.0	0.0
2	2.0	0.1	0.1
3	3.0	0.2	0.1
4	3.9	0.2	0.1
5	4.9	0.2	0.2
6	5.9	0.3	0.2
7	6.9	0.4	0.2
8	7.9	0.4	0.3
9	8.8	0.4	0.3
10	9.8	0.5	0.3
20	19.7	1.0	0.7
30	29.5	1.5	1.0
40	39.3	2.0	1.3
50	49.2	2.5	1.7

	3/67	3/66	3/65
0	11.2	11.0	10.8
1	33.5	33.0	32.5
2	55.8	55.0	54.2
3			

	3/64	3/63	3/62
0	10.7	10.5	10.3
1	32.0	31.5	31.0
2	53.3	52.5	51.7
3			

P	P

′	L Sin	d	L Tan	c d	L Cot	L Cos	d	′
0	9.31 788		9.32 747		0.67 253	9.99 040		60
		59		63			2	
1	9.31 847	60	9.32 810	62	0.67 190	9.99 038	3	59
2	9.31 907	59	9.32 872	61	0.67 128	9.99 035	3	58
3	9.31 966	59	9.32 933	62	0.67 067	9.99 032	2	57
4	9.32 025	59	9.32 995	62	0.67 005	9.99 030	3	56
5	9.32 084	59	9.33 057	62	0.66 943	9.99 027	3	55
6	9.32 143	59	9.33 119	61	0.66 881	9.99 024	3	54
7	9.32 202	59	9.33 180	62	0.66 820	9.99 022	2	53
8	9.32 261	58	9.33 242	61	0.66 758	9.99 019	3	52
9	9.32 319	59	9.33 303	62	0.66 697	9.99 016	3	51
10	9.32 378	59	9.33 365	61	0.66 635	9.99 013	3	50
11	9.32 437	58	9.33 426	61	0.66 574	9.99 011	2	49
12	9.32 495	58	9.33 487	61	0.66 513	9.99 008	3	48
13	9.32 553	59	9.33 548	61	0.66 452	9.99 005	3	47
14	9.32 612	58	9.33 609	61	0.66 391	9.99 002	3	46
15	9.32 670	58	9.33 670	61	0.66 330	9.99 000	2	45
16	9.32 728	58	9.33 731	61	0.66 269	9.98 997	3	44
17	9.32 786	58	9.33 792	61	0.66 208	9.98 994	3	43
18	9.32 844	58	9.33 853	60	0.66 147	9.98 991	2	42
19	9.32 902	58	9.33 913	61	0.66 087	9.98 989	3	41
20	9.32 960	58	9.33 974	60	0.66 026	9.98 986	3	40
21	9.33 018	57	9.34 034	61	0.65 966	9.98 983	3	39
22	9.33 075	58	9.34 095	60	0.65 905	9.98 980	3	38
23	9.33 133	57	9.34 155	60	0.65 845	9.98 978	3	37
24	9.33 190	58	9.34 215	61	0.65 785	9.98 975	3	36
25	9.33 248	57	9.34 276	60	0.65 724	9.98 972	3	35
26	9.33 305	57	9.34 336	60	0.65 664	9.98 969	2	34
27	9.33 362	58	9.34 396	60	0.65 604	9.98 967	3	33
28	9.33 420	57	9.34 456	60	0.65 544	9.98 964	3	32
29	9.33 477	57	9.34 516	60	0.65 484	9.98 961	3	31
30	9.33 534	57	9.34 576	59	0.65 424	9.98 958	3	30
31	9.33 591	56	9.34 635	60	0.65 365	9.98 955	2	29
32	9.33 647	57	9.34 695	60	0.65 305	9.98 953	3	28
33	9.33 704	57	9.34 755	59	0.65 245	9.98 950	3	27
34	9.33 761	57	9.34 814	60	0.65 186	9.98 947	3	26
35	9.33 818	56	9.34 874	59	0.65 126	9.98 944	3	25
36	9.33 874	57	9.34 933	59	0.65 067	9.98 941	3	24
37	9.33 931	56	9.34 992	59	0.65 008	9.98 938	2	23
38	9.33 987	56	9.35 051	60	0.64 949	9.98 936	3	22
39	9.34 043	57	9.35 111	59	0.64 889	9.98 933	3	21
40	9.34 100	56	9.35 170	59	0.64 830	9.98 930	3	20
41	9.34 156	56	9.35 229	59	0.64 771	9.98 927	3	19
42	9.34 212	56	9.35 288	59	0.64 712	9.98 924	3	18
43	9.34 268	56	9.35 347	58	0.64 653	9.98 921	3	17
44	9.34 324	56	9.35 405	59	0.64 595	9.98 919	2	16
45	9.34 380	56	9.35 464	59	0.64 536	9.98 916	3	15
46	9.34 436	55	9.35 523	58	0.64 477	9.98 913	3	14
47	9.34 491	56	9.35 581	59	0.64 419	9.98 910	3	13
48	9.34 547	55	9.35 640	58	0.64 360	9.98 907	3	12
49	9.34 602	56	9.35 698	59	0.64 302	9.98 904	3	11
50	9.34 658	55	9.35 757	58	0.64 243	9.98 901	3	10
51	9.34 713	56	9.35 815	58	0.64 185	9.98 898	3	9
52	9.34 769	55	9.35 873	58	0.64 127	9.98 896	2	8
53	9.34 824	55	9.35 931	58	0.64 069	9.98 893	3	7
54	9.34 879	55	9.35 989	58	0.64 011	9.98 890	3	6
55	9.34 934	55	9.36 047	58	0.63 953	9.98 887	3	5
56	9.34 989	55	9.36 105	58	0.63 895	9.98 884	3	4
57	9.35 044	55	9.36 163	58	0.63 837	9.98 881	3	3
58	9.35 099	55	9.36 221	58	0.63 779	9.98 878	3	2
59	9.35 154	55	9.36 279	57	0.63 721	9.98 875	3	1
60	9.35 209		9.36 336		0.63 664	9.98 872	3	0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	′

P P

	63	62	61
1	1.0	1.0	1.0
2	2.1	2.1	2.0
3	3.2	3.1	3.0
4	4.2	4.1	4.1
5	5.2	5.2	5.1
6	6.3	6.2	6.1
7	7.4	7.2	7.1
8	8.4	8.3	8.1
9	9.4	9.3	9.2
10	10.5	10.3	10.2
20	21.0	20.7	20.3
30	31.5	31.0	30.5
40	42.0	41.3	40.7
50	52.5	51.7	50.8

	60	59	58
1	1.0	1.0	1.0
2	2.0	2.0	1.9
3	3.0	3.0	2.9
4	4.0	3.9	3.9
5	5.0	4.9	4.8
6	6.0	5.9	5.8
7	7.0	6.9	6.8
8	8.0	7.9	7.7
9	9.0	8.8	8.7
10	10.0	9.8	9.7
20	20.0	19.7	19.3
30	30.0	29.5	29.0
40	40.0	39.3	38.7
50	50.0	49.2	48.3

	57	56	55
1	1.0	0.9	0.9
2	1.9	1.9	1.8
3	2.8	2.8	2.8
4	3.8	3.7	3.7
5	4.8	4.7	4.6
6	5.7	5.6	5.5
7	6.6	6.5	6.4
8	7.6	7.5	7.3
9	8.6	8.4	8.2
10	9.5	9.3	9.2
20	19.0	18.7	18.3
30	28.5	28.0	27.5
40	38.0	37.3	36.7
50	47.5	46.7	45.8

	$\frac{3}{62}$	$\frac{3}{61}$	$\frac{3}{60}$
0			
1	10.3	10.2	10.0
2	31.0	30.5	30.0
3	51.7	50.8	50.0

	$\frac{3}{59}$	$\frac{3}{58}$	$\frac{3}{57}$
0			
1	9.8	9.7	9.5
2	29.5	29.0	28.5
3	49.2	48.3	47.5

′	L Sin	d	L Tan	c d	L Cot	L Cos	d	′
0	9.35 209		9.36 336		0.63 664	9.98 872		60
		54		58			3	
1	9.35 263		9.36 394		0.63 606	9.98 869		59
		55		58			2	
2	9.35 318		9.36 452	57	0.63 548	9.98 867	3	58
		54		57			3	
3	9.35 373		9.36 509		0.63 491	9.98 864		57
		54		57			3	
4	9.35 427		9.36 566		0.63 434	9.98 861		56
		54		58			3	
5	9.35 481		9.36 624	57	0.63 376	9.98 858	3	55
		55		57			3	
6	9.35 536		9.36 681		0.63 319	9.98 855		54
		54		57			3	
7	9.35 590		9.36 738		0.63 262	9.98 852		53
		54		57			3	
8	9.35 644		9.36 795	57	0.63 205	9.98 849	3	52
		54		57			3	
9	9.35 698		9.36 852		0.63 148	9.98 846		51
		54		57			3	
10	9.35 752		9.36 909		0.63 091	9.98 843		50
		54		57			3	
11	9.35 806		9.36 966		0.63 034	9.98 840		49
		54		57			3	
12	9.35 860		9.37 023	57	0.62 977	9.98 837	3	48
		54		57			3	
13	9.35 914		9.37 080		0.62 920	9.98 834		47
		54		56			3	
14	9.35 968		9.37 137		0.62 863	9.98 831		46
		53		57			3	
15	9.36 022		9.37 193	56	0.62 807	9.98 828	3	45
		54		56			3	
16	9.36 075		9.37 250		0.62 750	9.98 825		44
		53		56			3	
17	9.36 129		9.37 306		0.62 694	9.98 822		43
		54		57			3	
18	9.36 182		9.37 363	56	0.62 637	9.98 819	3	42
		53		57			3	
19	9.36 236		9.37 419		0.62 581	9.98 816		41
		54		56			3	
20	9.36 289		9.37 476		0.62 524	9.98 813		40
		53		56			3	
21	9.36 342		9.37 532		0.62 468	9.98 810		39
		53		56			3	
22	9.36 395		9.37 588	56	0.62 412	9.98 807	3	38
		54		56			3	
23	9.36 449		9.37 644		0.62 356	9.98 804		37
		53		56			3	
24	9.36 502		9.37 700		0.62 300	9.98 801		36
		53		56			3	
25	9.36 555		9.37 756	56	0.62 244	9.98 798	3	35
		53		56			3	
26	9.36 608		9.37 812		0.62 188	9.98 795		34
		53		56			3	
27	9.36 660		9.37 868		0.62 132	9.98 792		33
		53		56			3	
28	9.36 713		9.37 924	56	0.62 076	9.98 789	3	32
		53		56			3	
29	9.36 766		9.37 980		0.62 020	9.98 786		31
		53		55			3	
30	9.36 819		9.38 035		0.61 965	9.98 783		30
		52		56			3	
31	9.36 871		9.38 091		0.61 909	9.98 780		29
		53		56			3	
32	9.36 924		9.38 147	56	0.61 853	9.98 777	3	28
		52		55			3	
33	9.36 976		9.38 202		0.61 798	9.98 774		27
		52		55			3	
34	9.37 028		9.38 257		0.61 743	9.98 771		26
		53		56			3	
35	9.37 081		9.38 313	55	0.61 687	9.98 768	3	25
		52		55			3	
36	9.37 133		9.38 368		0.61 632	9.98 765		24
		52		55			3	
37	9.37 185		9.38 423		0.61 577	9.98 762		23
		52		56			3	
38	9.37 237		9.38 479	55	0.61 521	9.98 759	3	22
		52		55			3	
39	9.37 289		9.38 534		0.61 466	9.98 756		21
		52		55			3	
40	9.37 341		9.38 589		0.61 411	9.98 753		20
		52		55			3	
41	9.37 393		9.38 644		0.61 356	9.98 750		19
		52		55			4	
42	9.37 445		9.38 699	55	0.61 301	9.98 746	4	18
		52		55			3	
43	9.37 497		9.38 754		0.61 246	9.98 743		17
		52		54			3	
44	9.37 549		9.38 808		0.61 192	9.98 740		16
		52		55			3	
45	9.37 600		9.38 863	55	0.61 137	9.98 737	3	15
		52		55			3	
46	9.37 652		9.38 918		0.61 082	9.98 734		14
		51		54			3	
47	9.37 703		9.38 972		0.61 028	9.98 731		13
		52		55			3	
48	9.37 755		9.39 027	55	0.60 973	9.98 728	3	12
		51		55			3	
49	9.37 806		9.39 082		0.60 918	9.98 725		11
		52		54			3	
50	9.37 858		9.39 136		0.60 864	9.98 722		10
		51		54			3	
51	9.37 909		9.39 190		0.60 810	9.98 719		9
		51		55			4	
52	9.37 960		9.39 245	54	0.60 755	9.98 715	4	8
		51		54			3	
53	9.38 011		9.39 299		0.60 701	9.98 712		7
		51		54			3	
54	9.38 062		9.39 353		0.60 647	9.98 709		6
		51		54			3	
55	9.38 113		9.39 407	54	0.60 593	9.98 706	3	5
		51		54			3	
56	9.38 164		9.39 461		0.60 539	9.98 703		4
		51		54			3	
57	9.38 215		9.39 515		0.60 485	9.98 700		3
		51		54			3	
58	9.38 266		9.39 569	54	0.60 431	9.98 697	3	2
		51		54			3	
59	9.38 317		9.39 623		0.60 377	9.98 694		1
		51		54			4	
60	9.38 368		9.39 677		0.60 323	9.98 690		0
′	L Cos	d	L Cot	c d	L Tan	L Sin	d	′

	P	P
	57	56	55
1	1.0	0.9	0.9
2	1.9	1.9	1.8
3	2.8	2.8	2.8
4	3.8	3.7	3.7
5	4.8	4.7	4.6
6	5.7	5.6	5.5
7	6.6	6.5	6.4
8	7.6	7.5	7.3
9	8.6	8.4	8.2
10	9.5	9.3	9.2
20	19.0	18.7	18.3
30	28.5	28.0	27.5
40	38.0	37.3	36.7
50	47.5	46.7	45.8

	54	53	52
1	0.9	0.9	0.9
2	1.8	1.8	1.7
3	2.7	2.6	2.6
4	3.6	3.5	3.5
5	4.5	4.4	4.3
6	5.4	5.3	5.2
7	6.3	6.2	6.1
8	7.2	7.1	6.9
9	8.1	8.0	7.8
10	9.0	8.8	8.7
20	18.0	17.7	17.3
30	27.0	26.5	26.0
40	36.0	35.3	34.7
50	45.0	44.2	43.3

	51	4	3	2
1	0.8	0.1	0.0	0.0
2	1.7	0.1	0.1	0.1
3	2.6	0.2	0.2	0.1
4	3.4	0.3	0.2	0.1
5	4.2	0.3	0.2	0.2
6	5.1	0.4	0.3	0.2
7	6.0	0.5	0.4	0.2
8	6.8	0.5	0.4	0.3
9	7.6	0.6	0.4	0.3
10	8.5	0.7	0.5	0.3
20	17.0	1.3	1.0	0.7
30	25.5	2.0	1.5	1.0
40	34.0	2.7	2.0	1.3
50	42.5	3.3	2.5	1.7

	4/55	4/54	3/58	3/57
0				
1	6.9	6.8	9.7	9.5
2	20.6	20.2	29.0	28.5
3	34.4	33.8	48.3	47.5
4	48.1	47.2	—	—

	3/56	3/55	3/54
0			
1	9.3	9.2	9.0
2	28.0	27.5	27.0
3	46.7	45.8	45.0

	P	P

′	L Sin	d	L Tan	c d	L Cot	L Cos	d	′
0	9.38 368	50	9.39 677	54	0.60 323	9.98 690	3	60
1	9.38 418	51	9.39 731	54	0.60 269	9.98 687	3	59
2	9.38 469	50	9.39 785	53	0.60 215	9.98 684	3	58
3	9.38 519	51	9.39 838	54	0.60 162	9.98 681	3	57
4	9.38 570	50	9.39 892	53	0.60 108	9.98 678	3	56
5	9.38 620	50	9.39 945	54	0.60 055	9.98 675	4	55
6	9.38 670	51	9.39 999	53	0.60 001	9.98 671	3	54
7	9.38 721	50	9.40 052	54	0.59 948	9.98 668	3	53
8	9.38 771	50	9.40 106	53	0.59 894	9.98 665	3	52
9	9.38 821	50	9.40 159	53	0.59 841	9.98 662	3	51
10	9.38 871	50	9.40 212	54	0.59 788	9.98 659	3	50
11	9.38 921	50	9.40 266	53	0.59 734	9.98 656	4	49
12	9.38 971	50	9.40 319	53	0.59 681	9.98 652	3	48
13	9.39 021	50	9.40 372	53	0.59 628	9.98 649	3	47
14	9.39 071	50	9.40 425	53	0.59 575	9.98 646	3	46
15	9.39 121	49	9.40 478	53	0.59 522	9.98 643	3	45
16	9.39 170	50	9.40 531	53	0.59 469	9.98 640	4	44
17	9.39 220	50	9.40 584	52	0.59 416	9.98 636	3	43
18	9.39 270	49	9.40 636	53	0.59 364	9.98 633	3	42
19	9.39 319	50	9.40 689	53	0.59 311	9.98 630	3	41
20	9.39 369	49	9.40 742	53	0.59 258	9.98 627	4	40
21	9.39 418	49	9.40 795	52	0.59 205	9.98 623	3	39
22	9.39 467	50	9.40 847	53	0.59 153	9.98 620	3	38
23	9.39 517	49	9.40 900	52	0.59 100	9.98 617	3	37
24	9.39 566	49	9.40 952	53	0.59 048	9.98 614	4	36
25	9.39 615	49	9.41 005	52	0.58 995	9.98 610	3	35
26	9.39 664	49	9.41 057	52	0.58 943	9.98 607	3	34
27	9.39 713	49	9.41 109	52	0.58 891	9.98 604	3	33
28	9.39 762	49	9.41 161	53	0.58 839	9.98 601	4	32
29	9.39 811	49	9.41 214	52	0.58 786	9.98 597	3	31
30	9.39 860	49	9.41 266	52	0.58 734	9.98 594	3	30
31	9.39 909	49	9.41 318	52	0.58 682	9.98 591	3	29
32	9.39 958	48	9.41 370	52	0.58 630	9.98 588	4	28
33	9.40 006	49	9.41 422	52	0.58 578	9.98 584	3	27
34	9.40 055	48	9.41 474	52	0.58 526	9.98 581	3	26
35	9.40 103	49	9.41 526	52	0.58 474	9.98 578	4	25
36	9.40 152	48	9.41 578	51	0.58 422	9.98 574	3	24
37	9.40 200	49	9.41 629	52	0.58 371	9.98 571	3	23
38	9.40 249	48	9.41 681	52	0.58 319	9.98 568	3	22
39	9.40 297	49	9.41 733	51	0.58 267	9.98 565	4	21
40	9.40 346	48	9.41 784	52	0.58 216	9.98 561	3	20
41	9.40 394	48	9.41 836	51	0.58 164	9.98 558	3	19
42	9.40 442	48	9.41 887	52	0.58 113	9.98 555	4	18
43	9.40 490	48	9.41 939	51	0.58 061	9.98 551	3	17
44	9.40 538	48	9.41 990	51	0.58 010	9.98 548	3	16
45	9.40 586	48	9.42 041	52	0.57 959	9.98 545	3	15
46	9.40 634	48	9.42 093	51	0.57 907	9.98 541	3	14
47	9.40 682	48	9.42 144	51	0.57 856	9.98 538	3	13
48	9.40 730	48	9.42 195	51	0.57 805	9.98 535	4	12
49	9.40 778	47	9.42 246	51	0.57 754	9.98 531	3	11
50	9.40 825	48	9.42 297	51	0.57 703	9.98 528	3	10
51	9.40 873	48	9.42 348	51	0.57 652	9.98 525	4	9
52	9.40 921	47	9.42 399	51	0.57 601	9.98 521	3	8
53	9.40 968	48	9.42 450	51	0.57 550	9.98 518	3	7
54	9.41 016	47	9.42 501	51	0.57 499	9.98 515	4	6
55	9.41 063	48	9.42 552	50	0.57 448	9.98 511	3	5
56	9.41 111	47	9.42 603	51	0.57 397	9.98 508	3	4
57	9.41 158	47	9.42 653	51	0.57 347	9.98 505	3	3
58	9.41 205	47	9.42 704	50	0.57 296	9.98 501	4	2
59	9.41 252	48	9.42 755	51	0.57 245	9.98 498	4	1
60	9.41 300		9.42 805	50	0.57 195	9.98 494	4	0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	′

P P			
	54	53	52
1	0.9	0.9	0.9
2	1.8	1.8	1.7
3	2.7	2.6	2.6
4	3.6	3.5	3.5
5	4.5	4.4	4.3
6	5.4	5.3	5.2
7	6.3	6.2	6.1
8	7.2	7.1	6.9
9	8.1	8.0	7.8
10	9.0	8.8	8.7
20	18.0	17.7	17.3
30	27.0	26.5	26.0
40	36.0	35.3	34.7
50	45.0	44.2	43.3
	51	50	49
1	0.8	0.8	0.8
2	1.7	1.7	1.6
3	2.6	2.5	2.4
4	3.4	3.3	3.3
5	4.2	4.2	4.1
6	5.1	5.0	4.9
7	6.0	5.8	5.7
8	6.8	6.7	6.5
9	7.6	7.5	7.4
10	8.5	8.3	8.2
20	17.0	16.7	16.3
30	25.5	25.0	24.5
40	34.0	33.3	32.7
50	42.5	41.7	40.8
	48	47	4
1	0.8	0.8	0.1
2	1.6	1.6	0.1
3	2.4	2.4	0.2
4	3.2	3.1	0.3
5	4.0	3.9	0.3
6	4.8	4.7	0.4
7	5.6	5.5	0.5
8	6.4	6.3	0.5
9	7.2	7.0	0.6
10	8.0	7.8	0.7
20	16.0	15.7	1.3
30	24.0	23.5	2.0
40	32.0	31.3	2.7
50	40.0	39.2	3.3

	4	4	4	4
	54	53	52	51
0	6.8	6.6	6.5	6.4
1	20.2	19.9	19.5	19.1
2	33.8	33.1	32.5	31.9
3	47.2	46.4	45.5	44.6
4				

	3	3	3	3
	54	53	52	51
0	9.0	8.8	8.7	8.5
1	27.0	26.5	26.0	25.5
2	45.0	44.2	43.3	42.5
3				

P P

′	L Sin	d	L Tan	c d	L Cot	L Cos	d	′
0	9.41 300		9.42 805		0.57 195	9.98 494		60
		47		51			3	
1	9.41 347		9.42 856		0.57 144	9.98 491		59
		47		50			3	
2	9.41 394		9.42 906		0.57 094	9.98 488	4	58
		47		51			3	
3	9.41 441		9.42 957		0.57 043	9.98 484		57
		47		50			4	
4	9.41 488		9.43 007		0.56 993	9.98 481		56
		47		50			3	
5	9.41 535		9.43 057		0.56 943	9.98 477		55
		47		51			3	
6	9.41 582		9.43 108		0.56 892	9.98 474		54
		46		50			4	
7	9.41 628		9.43 158		0.56 842	9.98 471		53
		47		50			3	
8	9.41 675		9.43 208		0.56 792	9.98 467		52
		47		50			3	
9	9.41 722		9.43 258		0.56 742	9.98 464		51
		46		50			4	
10	9.41 768		9.43 308		0.56 692	9.98 460		50
		47		50			3	
11	9.41 815		9.43 358		0.56 642	9.98 457		49
		46		50			4	
12	9.41 861		9.43 408		0.56 592	9.98 453		48
		47		50			3	
13	9.41 908		9.43 458		0.56 542	9.98 450		47
		46		50			4	
14	9.41 954		9.43 508		0.56 492	9.98 447		46
		47		49			4	
15	9.42 001		9.43 558		0.56 442	9.98 443		45
		46		50			3	
16	9.42 047		9.43 607		0.56 393	9.98 440		44
		46		50			4	
17	9.42 093		9.43 657		0.56 343	9.98 436		43
		47		50			3	
18	9.42 140		9.43 707		0.56 293	9.98 433		42
		46		49			4	
19	9.42 186		9.43 756		0.56 244	9.98 429		41
		46		50			3	
20	9.42 232		9.43 806		0.56 194	9.98 426		40
		46		49			4	
21	9.42 278		9.43 855		0.56 145	9.98 422		39
		46		50			3	
22	9.42 324		9.43 905		0.56 095	9.98 419		38
		46		49			4	
23	9.42 370		9.43 954		0.56 046	9.98 415		37
		46		50			3	
24	9.42 416		9.44 004		0.55 996	9.98 412		36
		45		49			3	
25	9.42 461		9.44 053		0.55 947	9.98 409		35
		46		49			4	
26	9.42 507		9.44 102		0.55 898	9.98 405		34
		46		49			3	
27	9.42 553		9.44 151		0.55 849	9.98 402		33
		46		50			4	
28	9.42 599		9.44 201		0.55 799	9.98 398		32
		45		49			3	
29	9.42 644		9.44 250		0.55 750	9.98 395		31
		46		49			4	
30	9.42 690		9.44 299		0.55 701	9.98 391		30
		45		49			4	
31	9.42 735		9.44 348		0.55 652	9.98 388		29
		46		49			4	
32	9.42 781		9.44 397		0.55 603	9.98 384		28
		45		49			3	
33	9.42 826		9.44 446		0.55 554	9.98 381		27
		46		49			4	
34	9.42 872		9.44 495		0.55 505	9.98 377		26
		45		48			4	
35	9.42 917		9.44 544		0.55 456	9.98 373		25
		45		49			3	
36	9.42 962		9.44 592		0.55 408	9.98 370		24
		46		49			4	
37	9.43 008		9.44 641		0.55 359	9.98 366		23
		45		49			3	
38	9.43 053		9.44 690		0.55 310	9.98 363		22
		45		48			4	
39	9.43 098		9.44 738		0.55 262	9.98 359		21
		45		49			3	
40	9.43 143		9.44 787		0.55 213	9.98 356		20
		45		49			4	
41	9.43 188		9.44 836		0.55 164	9.98 352		19
		45		48			3	
42	9.43 233		9.44 884		0.55 116	9.98 349		18
		45		49			4	
43	9.43 278		9.44 933		0.55 067	9.98 345		17
		45		48			3	
44	9.43 323		9.44 981		0.55 019	9.98 342		16
		44		48			4	
45	9.43 367		9.45 029		0.54 971	9.98 338		15
		45		49			4	
46	9.43 412		9.45 078		0.54 922	9.98 334		14
		45		48			3	
47	9.43 457		9.45 126		0.54 874	9.98 331		13
		45		48			4	
48	9.43 502		9.45 174		0.54 826	9.98 327		12
		44		48			3	
49	9.43 546		9.45 222		0.54 778	9.98 324		11
		45		49			4	
50	9.43 591		9.45 271		0.54 729	9.98 320		10
		44		48			3	
51	9.43 635		9.45 319		0.54 681	9.98 317		9
		45		48			4	
52	9.43 680		9.45 367		0.54 633	9.98 313		8
		44		48			4	
53	9.43 724		9.45 415		0.54 585	9.98 309		7
		45		48			3	
54	9.43 769		9.45 463		0.54 537	9.98 306		6
		44		48			4	
55	9.43 813		9.45 511		0.54 489	9.98 302		5
		44		47			3	
56	9.43 857		9.45 559		0.54 441	9.98 299		4
		44		48			4	
57	9.43 901		9.45 606		0.54 394	9.98 295		3
		45		48			3	
58	9.43 946		9.45 654		0.54 346	9.98 291		2
		44		48			3	
59	9.43 990		9.45 702		0.54 298	9.98 288		1
		44		48			4	
60	9.44 034		9.45 750		0.54 250	9.98 284		0
′	L Cos	d	L Cot	c d	L Tan	L Sin	d	′

P P

	51	50	49
1	0.8	0.8	0.8
2	1.7	1.7	1.6
3	2.6	2.5	2.4
4	3.4	3.3	3.3
5	4.2	4.2	4.1
6	5.1	5.0	4.9
7	6.0	5.8	5.7
8	6.8	6.7	6.5
9	7.6	7.5	7.4
10	8.5	8.3	8.2
20	17.0	16.7	16.3
30	25.5	25.0	24.5
40	34.0	33.3	32.7
50	42.5	41.7	40.8

	48	47	46
1	0.8	0.8	0.8
2	1.6	1.6	1.5
3	2.4	2.4	2.3
4	3.2	3.1	3.1
5	4.0	3.9	3.8
6	4.8	4.7	4.6
7	5.6	5.5	5.4
8	6.4	6.3	6.1
9	7.2	7.0	6.9
10	8.0	7.8	7.7
20	16.0	15.7	15.3
30	24.0	23.5	23.0
40	32.0	31.3	30.7
50	40.0	39.2	38.3

	45	44	4	3
1	0.8	0.7	0.1	0.0
2	1.5	1.5	0.1	0.1
3	2.2	2.2	0.2	0.2
4	3.0	2.9	0.3	0.2
5	3.8	3.7	0.3	0.2
6	4.5	4.4	0.4	0.3
7	5.2	5.1	0.5	0.4
8	6.0	5.9	0.5	0.4
9	6.8	6.6	0.6	0.4
10	7.5	7.3	0.7	0.5
20	15.0	14.7	1.3	1.0
30	22.5	22.0	2.0	1.5
40	30.0	29.3	2.7	2.0
50	37.5	36.7	3.3	2.5

	4/50	4/49	4/48	4/47
0				
1	6.2	6.1	6.0	5.9
2	18.8	18.4	18.0	17.6
3	31.2	30.6	30.0	29.4
4	43.8	42.9	42.0	41.1

	3/51	3/50	3/49	3/48
0				
1	8.5	8.3	8.2	8.0
2	25.5	25.0	24.5	24.0
3	42.5	41.7	40.8	40.0

P P

	L Sin	d	L Tan	c d	L Cot	L Cos	d	
0	9.44 034		9.45 750		0.54 250	9.98 284		60
		44		47			3	
1	9.44 078		9.45 797		0.54 203	9.98 281		59
		44		48			4	
2	9.44 122		9.45 845		0.54 155	9.98 277		58
		44		47			4	
3	9.44 166		9.45 892		0.54 108	9.98 273		57
		44		48			3	
4	9.44 210		9.45 940		0.54 060	9.98 270		56
		43		47			4	
5	9.44 253		9.45 987		0.54 013	9.98 266		55
		43		48			4	
6	9.44 297		9.46 035		0.53 965	9.98 262		54
		44		47			3	
7	9.44 341		9.46 082		0.53 918	9.98 259		53
		44		48			4	
8	9.44 385		9.46 130		0.53 870	9.98 255		52
		43		47			4	
9	9.44 428		9.46 177		0.53 823	9.98 251		51
		44		47			3	
10	9.44 472		9.46 224		0.53 776	9.98 248		50
		44		47			4	
11	9.44 516		9.46 271		0.53 729	9.98 244		49
		43		48			4	
12	9.44 559		9.46 319		0.53 681	9.98 240		48
		43		47			3	
13	9.44 602		9.46 366		0.53 634	9.98 237		47
		44		47			4	
14	9.44 646		9.46 413		0.53 587	9.98 233		46
		43		47			4	
15	9.44 689		9.46 460		0.53 540	9.98 229		45
		44		47			3	
16	9.44 733		9.46 507		0.53 493	9.98 226		44
		43		47			4	
17	9.44 776		9.46 554		0.53 446	9.98 222		43
		43		47			4	
18	9.44 819		9.46 601		0.53 399	9.98 218		42
		43		47			3	
19	9.44 862		9.46 648		0.53 352	9.98 215		41
		43		46			4	
20	9.44 905		9.46 694		0.53 306	9.98 211		40
		43		47			4	
21	9.44 948		9.46 741		0.53 259	9.98 207		39
		44		47			4	
22	9.44 992		9.46 788		0.53 212	9.98 204		38
		43		47			3	
23	9.45 035		9.46 835		0.53 165	9.98 200		37
		42		46			4	
24	9.45 077		9.46 881		0.53 119	9.98 196		36
		43		47			4	
25	9.45 120		9.46 928		0.53 072	9.98 192		35
		43		47			3	
26	9.45 163		9.46 975		0.53 025	9.98 189		34
		43		46			4	
27	9.45 206		9.47 021		0.52 979	9.98 185		33
		43		47			4	
28	9.45 249		9.47 068		0.52 932	9.98 181		32
		43		46			4	
29	9.45 292		9.47 114		0.52 886	9.98 177		31
		42		46			3	
30	9.45 334		9.47 160		0.52 840	9.98 174		30
		43		47			4	
31	9.45 377		9.47 207		0.52 793	9.98 170		29
		42		46			4	
32	9.45 419		9.47 253		0.52 747	9.98 166		28
		43		46			4	
33	9.45 462		9.47 299		0.52 701	9.98 162		27
		42		47			3	
34	9.45 504		9.47 346		0.52 654	9.98 159		26
		43		46			4	
35	9.45 547		9.47 392		0.52 608	9.98 155		25
		42		46			4	
36	9.45 589		9.47 438		0.52 562	9.98 151		24
		43		46			4	
37	9.45 632		9.47 484		0.52 516	9.98 147		23
		42		46			3	
38	9.45 674		9.47 530		0.52 470	9.98 144		22
		42		46			4	
39	9.45 716		9.47 576		0.52 424	9.98 140		21
		42		46			4	
40	9.45 758		9.47 622		0.52 378	9.98 136		20
		43		46			4	
41	9.45 801		9.47 668		0.52 332	9.98 132		19
		42		46			3	
42	9.45 843		9.47 714		0.52 286	9.98 129		18
		42		46			4	
43	9.45 885		9.47 760		0.52 240	9.98 125		17
		42		46			4	
44	9.45 927		9.47 806		0.52 194	9.98 121		16
		42		46			4	
45	9.45 969		9.47 852		0.52 148	9.98 117		15
		42		46			4	
46	9.46 011		9.47 897		0.52 103	9.98 113		14
		42		46			3	
47	9.46 053		9.47 943		0.52 057	9.98 110		13
		42		46			4	
48	9.46 095		9.47 989		0.52 011	9.98 106		12
		41		46			4	
49	9.46 136		9.48 035		0.51 965	9.98 102		11
		42		45			4	
50	9.46 178		9.48 080		0.51 920	9.98 098		10
		42		46			4	
51	9.46 220		9.48 126		0.51 874	9.98 094		9
		42		45			4	
52	9.46 262		9.48 171		0.51 829	9.98 090		8
		41		46			3	
53	9.46 303		9.48 217		0.51 783	9.98 087		7
		42		45			4	
54	9.46 345		9.48 262		0.51 738	9.98 083		6
		41		45			4	
55	9.46 386		9.48 307		0.51 693	9.98 079		5
		42		46			4	
56	9.46 428		9.48 353		0.51 647	9.98 075		4
		41		45			4	
57	9.46 469		9.48 398		0.51 602	9.98 071		3
		42		45			4	
58	9.46 511		9.48 443		0.51 557	9.98 067		2
		41		46			4	
59	9.46 552		9.48 489		0.51 511	9.98 063		1
		42		45			3	
60	9.46 594		9.48 534		0.51 466	9.98 060		0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	

	P P			
	48	47	46	
1	0.8	0.8	0.8	
2	1.6	1.6	1.5	
3	2.4	2.4	2.3	
4	3.2	3.1	3.1	
5	4.0	3.9	3.8	
6	4.8	4.7	4.6	
7	5.6	5.5	5.4	
8	6.4	6.3	6.1	
9	7.2	7.0	6.9	
10	8.0	7.8	7.7	
20	16.0	15.7	15.3	
30	24.0	23.5	23.0	
40	32.0	31.3	30.7	
50	40.0	39.2	38.3	
	45	44	43	
1	0.8	0.7	0.7	
2	1.5	1.5	1.4	
3	2.2	2.2	2.2	
4	3.0	2.9	2.9	
5	3.8	3.7	3.6	
6	4.5	4.4	4.3	
7	5.2	5.1	5.0	
8	6.0	5.9	5.7	
9	6.8	6.6	6.4	
10	7.5	7.3	7.2	
20	15.0	14.7	14.3	
30	22.5	22.0	21.5	
40	30.0	29.3	28.7	
50	37.5	36.7	35.8	
	42	41	4	
1	0.7	0.7	0.1	
2	1.4	1.4	0.1	
3	2.1	2.0	0.2	
4	2.8	2.7	0.3	
5	3.5	3.4	0.3	
6	4.2	4.1	0.4	
7	4.9	4.8	0.5	
8	5.6	5.5	0.5	
9	6.3	6.2	0.6	
10	7.0	6.8	0.7	
20	14.0	13.7	1.3	
30	21.0	20.5	2.0	
40	28.0	27.3	2.7	
50	35.0	34.2	3.3	

	4/48	4/47	4/46	
0				
1	6.0	5.9	5.8	
2	18.0	17.6	17.2	
3	30.0	29.4	28.8	
4	42.0	41.1	40.2	
	3/48	3/47	3/46	
0				
1	8.0	7.8	7.7	
2	24.0	23.5	23.0	
3	40.0	39.2	38.3	

P P

17°

*107° 197° *287°

′	L Sin	d	L Tan	c d	L Cot	L Cos	d	
0	9.46 594		9.48 534		0.51 466	9.98 060		60
		41		45			4	
1	9.46 635		9.48 579		0.51 421	9.98 056		59
		41		45			4	
2	9.46 676		9.48 624		0.51 376	9.98 052		58
		41		45			4	
3	9.46 717		9.48 669		0.51 331	9.98 048		57
		41		45			4	
4	9.46 758		9.48 714		0.51 286	9.98 044		56
		42		45			4	
5	9.46 800		9.48 759		0.51 241	9.98 040		55
		41		45			4	
6	9.46 841		9.48 804		0.51 196	9.98 036		54
		41		45			4	
7	9.46 882		9.48 849		0.51 151	9.98 032		53
		41		45			3	
8	9.46 923		9.48 894		0.51 106	9.98 029		52
		41		45			4	
9	9.46 964		9.48 939		0.51 061	9.98 025		51
		41		45			4	
10	9.47 005		9.48 984		0.51 016	9.98 021		50
		40		45			4	
11	9.47 045		9.49 029		0.50 971	9.98 017		49
		41		44			4	
12	9.47 086		9.49 073		0.50 927	9.98 013		48
		41		45			4	
13	9.47 127		9.49 118		0.50 882	9.98 009		47
		41		45			4	
14	9.47 168		9.49 163		0.50 837	9.98 005		46
		41		44			4	
15	9.47 209		9.49 207		0.50 793	9.98 001		45
		40		45			4	
16	9.47 249		9.49 252		0.50 748	9.97 997		44
		41		44			4	
17	9.47 290		9.49 296		0.50 704	9.97 993		43
		40		45			4	
18	9.47 330		9.49 341		0.50 659	9.97 989		42
		41		44			3	
19	9.47 371		9.49 385		0.50 615	9.97 986		41
		40		45			4	
20	9.47 411		9.49 430		0.50 570	9.97 982		40
		41		44			4	
21	9.47 452		9.49 474		0.50 526	9.97 978		39
		40		45			4	
22	9.47 492		9.49 519		0.50 481	9.97 974		38
		41		44			4	
23	9.47 533		9.49 563		0.50 437	9.97 970		37
		40		44			4	
24	9.47 573		9.49 607		0.50 393	9.97 966		36
		40		45			4	
25	9.47 613		9.49 652		0.50 348	9.97 962		35
		41		44			4	
26	9.47 654		9.49 696		0.50 304	9.97 958		34
		40		44			4	
27	9.47 694		9.49 740		0.50 260	9.97 954		33
		40		44			4	
28	9.47 734		9.49 784		0.50 216	9.97 950		32
		40		44			4	
29	9.47 774		9.49 828		0.50 172	9.97 946		31
		40		44			4	
30	9.47 814		9.49 872		0.50 128	9.97 942		30
		40		44			4	
31	9.47 854		9.49 916		0.50 084	9.97 938		29
		40		44			4	
32	9.47 894		9.49 960		0.50 040	9.97 934		28
		40		44			4	
33	9.47 934		9.50 004		0.49 996	9.97 930		27
		40		44			4	
34	9.47 974		9.50 048		0.49 952	9.97 926		26
		40		44			4	
35	9.48 014		9.50 092		0.49 908	9.97 922		25
		40		44			4	
36	9.48 054		9.50 136		0.49 864	9.97 918		24
		40		44			4	
37	9.48 094		9.50 180		0.49 820	9.97 914		23
		39		43			4	
38	9.48 133		9.50 223		0.49 777	9.97 910		22
		40		44			4	
39	9.48 173		9.50 267		0.49 733	9.97 906		21
		40		44			4	
40	9.48 213		9.50 311		0.49 689	9.97 902		20
		39		44			4	
41	9.48 252		9.50 355		0.49 645	9.97 898		19
		40		43			4	
42	9.48 292		9.50 398		0.49 602	9.97 894		18
		40		44			4	
43	9.48 332		9.50 442		0.49 558	9.97 890		17
		39		43			4	
44	9.48 371		9.50 485		0.49 515	9.97 886		16
		40		44			4	
45	9.48 411		9.50 529		0.49 471	9.97 882		15
		39		43			4	
46	9.48 450		9.50 572		0.49 428	9.97 878		14
		40		44			4	
47	9.48 490		9.50 616		0.49 384	9.97 874		13
		39		43			4	
48	9.48 529		9.50 659		0.49 341	9.97 870		12
		39		44			4	
49	9.48 568		9.50 703		0.49 297	9.97 866		11
		39		43			5	
50	9.48 607		9.50 746		0.49 254	9.97 861		10
		40		43			4	
51	9.48 647		9.50 789		0.49 211	9.97 857		9
		39		44			4	
52	9.48 686		9.50 833		0.49 167	9.97 853		8
		39		43			4	
53	9.48 725		9.50 876		0.49 124	9.97 849		7
		39		43			4	
54	9.48 764		9.50 919		0.49 081	9.97 845		6
		39		43			4	
55	9.48 803		9.50 962		0.49 038	9.97 841		5
		39		43			4	
56	9.48 842		9.51 005		0.48 995	9.97 837		4
		39		43			4	
57	9.48 881		9.51 048		0.48 952	9.97 833		3
		39		44			4	
58	9.48 920		9.51 092		0.48 908	9.97 829		2
		39		43			4	
59	9.48 959		9.51 135		0.48 865	9.97 825		1
		39		43			4	
60	9.48 998		9.51 178		0.48 822	9.97 821		0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	

P	P		
	45	44	43
1	0.8	0.7	0.7
2	1.5	1.5	1.4
3	2.2	2.2	2.2
4	3.0	2.9	2.9
5	3.8	3.7	3.6
6	4.5	4.4	4.3
7	5.2	5.1	5.0
8	6.0	5.9	5.7
9	6.8	6.6	6.4
10	7.5	7.3	7.2
20	15.0	14.7	14.3
30	22.5	22.0	21.5
40	30.0	29.3	28.7
50	37.5	36.7	35.8

	42	41	40
1	0.7	0.7	0.7
2	1.4	1.4	1.3
3	2.1	2.0	2.0
4	2.8	2.7	2.7
5	3.5	3.4	3.3
6	4.2	4.1	4.0
7	4.9	4.8	4.7
8	5.6	5.5	5.3
9	6.3	6.2	6.0
10	7.0	6.8	6.7
20	14.0	13.7	13.3
30	21.0	20.5	20.0
40	28.0	27.3	26.7
50	35.0	34.2	33.3

	39	5	4	3
1	0.6	0.1	0.1	0.0
2	1.3	0.2	0.1	0.1
3	2.0	0.2	0.2	0.2
4	2.6	0.3	0.3	0.2
5	3.2	0.4	0.3	0.2
6	3.9	0.5	0.4	0.3
7	4.6	0.6	0.5	0.4
8	5.2	0.7	0.5	0.4
9	5.8	0.8	0.6	0.4
10	6.5	0.8	0.7	0.5
20	13.0	1.7	1.3	1.0
30	19.5	2.5	2.0	1.5
40	26.0	3.3	2.7	2.0
50	32.5	4.2	3.3	2.5

	5/43	4/45	4/44
0			
1	4.3	5.6	5.5
2	12.9	16.9	16.5
3	21.5	28.1	27.5
4	30.1	39.4	38.5
5	38.7	—	—

	4/43	3/45	3/44
0			
1	5.4	7.5	7.3
2	16.1	22.5	22.0
3	26.9	37.5	36.7
4	37.6	—	—

	L Sin	d	L Tan	c d	L Cot	L Cos	d	
0	9.48 998		9.51 178		0.48 822	9.97 821		60
1	9.49 037	39	9.51 221	43	0.48 779	9.97 817	4	59
2	9.49 076	39	9.51 264	43	0.48 736	9.97 812	5	58
3	9.49 115	39	9.51 306	42	0.48 694	9.97 808	4	57
4	9.49 153	38	9.51 349	43	0.48 651	9.97 804	4	56
5	9.49 192	39	9.51 392	43	0.48 608	9.97 800	4	55
6	9.49 231	39	9.51 435	43	0.48 565	9.97 796	4	54
7	9.49 269	38	9.51 478	43	0.48 522	9.97 792	4	53
8	9.49 308	39	9.51 520	42	0.48 480	9.97 788	4	52
9	9.49 347	39	9.51 563	43	0.48 437	9.97 784	4	51
10	9.49 385	38	9.51 606	43	0.48 394	9.97 779	5	50
11	9.49 424	39	9.51 648	42	0.48 352	9.97 775	4	49
12	9.49 462	38	9.51 691	43	0.48 309	9.97 771	4	48
13	9.49 500	38	9.51 734	43	0.48 266	9.97 767	4	47
14	9.49 539	39	9.51 776	42	0.48 224	9.97 763	4	46
15	9.49 577	38	9.51 819	43	0.48 181	9.97 759	4	45
16	9.49 615	38	9.51 861	42	0.48 139	9.97 754	5	44
17	9.49 654	39	9.51 903	42	0.48 097	9.97 750	4	43
18	9.49 692	38	9.51 946	43	0.48 054	9.97 746	4	42
19	9.49 730	38	9.51 988	42	0.48 012	9.97 742	4	41
20	9.49 768	38	9.52 031	42	0.47 969	9.97 738	4	40
21	9.49 806	38	9.52 073	42	0.47 927	9.97 734	4	39
22	9.49 844	38	9.52 115	42	0.47 885	9.97 729	5	38
23	9.49 882	38	9.52 157	43	0.47 843	9.97 725	4	37
24	9.49 920	38	9.52 200	42	0.47 800	9.97 721	4	36
25	9.49 958	38	9.52 242	42	0.47 758	9.97 717	4	35
26	9.49 996	38	9.52 284	42	0.47 716	9.97 713	5	34
27	9.50 034	38	9.52 326	42	0.47 674	9.97 708	4	33
28	9.50 072	38	9.52 368	42	0.47 632	9.97 704	4	32
29	9.50 110	38	9.52 410	42	0.47 590	9.97 700	4	31
30	9.50 148	37	9.52 452	42	0.47 548	9.97 696	5	30
31	9.50 185	38	9.52 494	42	0.47 506	9.97 691	4	29
32	9.50 223	38	9.52 536	42	0.47 464	9.97 687	4	28
33	9.50 261	37	9.52 578	42	0.47 422	9.97 683	4	27
34	9.50 298	38	9.52 620	41	0.47 380	9.97 679	5	26
35	9.50 336	38	9.52 661	42	0.47 339	9.97 674	4	25
36	9.50 374	37	9.52 703	42	0.47 297	9.97 670	4	24
37	9.50 411	38	9.52 745	42	0.47 255	9.97 666	4	23
38	9.50 449	37	9.52 787	42	0.47 213	9.97 662	5	22
39	9.50 486	37	9.52 829	41	0.47 171	9.97 657	4	21
40	9.50 523	38	9.52 870	42	0.47 130	9.97 653	4	20
41	9.50 561	37	9.52 912	41	0.47 088	9.97 649	4	19
42	9.50 598	37	9.52 953	42	0.47 047	9.97 645	5	18
43	9.50 635	38	9.52 995	42	0.47 005	9.97 640	4	17
44	9.50 673	37	9.53 037	41	0.46 963	9.97 636	4	16
45	9.50 710	37	9.53 078	42	0.46 922	9.97 632	4	15
46	9.50 747	37	9.53 120	41	0.46 880	9.97 628	5	14
47	9.50 784	37	9.53 161	41	0.46 839	9.97 623	4	13
48	9.50 821	37	9.53 202	42	0.46 798	9.97 619	4	12
49	9.50 858	37	9.53 244	41	0.46 756	9.97 615	4	11
50	9.50 896	37	9.53 285	42	0.46 715	9.97 610	5	10
51	9.50 933	37	9.53 327	41	0.46 673	9.97 606	4	9
52	9.50 970	37	9.53 368	41	0.46 632	9.97 602	4	8
53	9.51 007	36	9.53 409	41	0.46 591	9.97 597	5	7
54	9.51 043	37	9.53 450	42	0.46 550	9.97 593	4	6
55	9.51 080	37	9.53 492	41	0.46 508	9.97 589	4	5
56	9.51 117	37	9.53 533	41	0.46 467	9.97 584	5	4
57	9.51 154	37	9.53 574	41	0.46 426	9.97 580	4	3
58	9.51 191	36	9.53 615	41	0.46 385	9.97 576	4	2
59	9.51 227	37	9.53 656	41	0.46 344	9.97 571	4	1
60	9.51 264		9.53 697		0.46 303	9.97 567		0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	

	P	P	
	43	42	41
1	0.7	0.7	0.7
2	1.4	1.4	1.4
3	2.2	2.1	2.0
4	2.9	2.8	2.7
5	3.6	3.5	3.4
6	4.3	4.2	4.1
7	5.0	4.9	4.8
8	5.7	5.6	5.5
9	6.4	6.3	6.2
10	7.2	7.0	6.8
20	14.3	14.0	13.7
30	21.5	21.0	20.5
40	28.7	28.0	27.3
50	35.8	35.0	34.2
	39	38	37
1	0.6	0.6	0.6
2	1.3	1.3	1.2
3	2.0	1.9	1.8
4	2.6	2.5	2.5
5	3.2	3.2	3.1
6	3.9	3.8	3.7
7	4.6	4.4	4.3
8	5.2	5.1	4.9
9	5.8	5.7	5.6
10	6.5	6.3	6.2
20	13.0	12.7	12.3
30	19.5	19.0	18.5
40	26.0	25.3	24.7
50	32.5	31.7	30.8
	36	35	34
1	0.6	0.1	0.1
2	1.2	0.2	0.1
3	1.8	0.2	0.2
4	2.4	0.3	0.3
5	3.0	0.4	0.3
6	3.6	0.5	0.4
7	4.2	0.6	0.5
8	4.8	0.7	0.5
9	5.4	0.8	0.6
10	6.0	0.8	0.7
20	12.0	1.7	1.3
30	18.0	2.5	2.0
40	24.0	3.3	2.7
50	30.0	4.2	3.3

	$\frac{5}{43}$	$\frac{5}{42}$	$\frac{5}{41}$
0	4.3	4.2	4.1
1	12.9	12.6	12.3
2	21.5	21.0	20.5
3	30.1	29.4	28.7
4	38.7	37.8	36.9
5			

	$\frac{4}{43}$	$\frac{4}{42}$	$\frac{4}{41}$
0	5.4	5.2	5.1
1	16.1	15.8	15.4
2	26.9	26.2	25.6
3	37.6	36.8	35.9
4			

P P

19°

	L Sin	d	L Tan	c d	L Cot	L Cos	d	
0	9.51 264		9.53 697		0.46 303	9.97 567		60
1	9.51 301	37	9.53 738	41	0.46 262	9.97 563	4	59
2	9.51 338	37	9.53 779	41	0.46 221	9.97 558	5	58
3	9.51 374	36	9.53 820	41	0.46 180	9.97 554	4	57
4	9.51 411	37	9.53 861	41	0.46 139	9.97 550	4	56
5	9.51 447	36	9.53 902	41	0.46 098	9.97 545	5	55
6	9.51 484	37	9.53 943	41	0.46 057	9.97 541	4	54
7	9.51 520	36	9.53 984	41	0.46 016	9.97 536	5	53
8	9.51 557	37	9.54 025	41	0.45 975	9.97 532	4	52
9	9.51 593	36	9.54 065	40	0.45 935	9.97 528	4	51
10	9.51 629	36	9.54 106	41	0.45 894	9.97 523	5	50
11	9.51 666	37	9.54 147	41	0.45 853	9.97 519	4	49
12	9.51 702	36	9.54 187	40	0.45 813	9.97 515	4	48
13	9.51 738	36	9.54 228	41	0.45 772	9.97 510	5	47
14	9.51 774	36	9.54 269	41	0.45 731	9.97 506	4	46
15	9.51 811	37	9.54 309	40	0.45 691	9.97 501	5	45
16	9.51 847	36	9.54 350	41	0.45 650	9.97 497	4	44
17	9.51 883	36	9.54 390	40	0.45 610	9.97 492	5	43
18	9.51 919	36	9.54 431	41	0.45 569	9.97 488	4	42
19	9.51 955	36	9.54 471	40	0.45 529	9.97 484	4	41
20	9.51 991	36	9.54 512	41	0.45 488	9.97 479	5	40
21	9.52 027	36	9.54 552	40	0.45 448	9.97 475	4	39
22	9.52 063	36	9.54 593	41	0.45 407	9.97 470	5	38
23	9.52 099	36	9.54 633	40	0.45 367	9.97 466	4	37
24	9.52 135	36	9.54 673	40	0.45 327	9.97 461	5	36
25	9.52 171	36	9.54 714	41	0.45 286	9.97 457	4	35
26	9.52 207	36	9.54 754	40	0.45 246	9.97 453	4	34
27	9.52 242	35	9.54 794	40	0.45 206	9.97 448	5	33
28	9.52 278	36	9.54 835	41	0.45 165	9.97 444	4	32
29	9.52 314	36	9.54 875	40	0.45 125	9.97 439	5	31
30	9.52 350	36	9.54 915	40	0.45 085	9.97 435	4	30
31	9.52 385	35	9.54 955	40	0.45 045	9.97 430	5	29
32	9.52 421	36	9.54 995	40	0.45 005	9.97 426	4	28
33	9.52 456	35	9.55 035	40	0.44 965	9.97 421	5	27
34	9.52 492	36	9.55 075	40	0.44 925	9.97 417	4	26
35	9.52 527	35	9.55 115	40	0.44 885	9.97 412	5	25
36	9.52 563	36	9.55 155	40	0.44 845	9.97 408	4	24
37	9.52 598	35	9.55 195	40	0.44 805	9.97 403	5	23
38	9.52 634	36	9.55 235	40	0.44 765	9.97 399	4	22
39	9.52 669	35	9.55 275	40	0.44 725	9.97 394	5	21
40	9.52 705	36	9.55 315	40	0.44 685	9.97 390	4	20
41	9.52 740	35	9.55 355	40	0.44 645	9.97 385	5	19
42	9.52 775	35	9.55 395	40	0.44 605	9.97 381	4	18
43	9.52 811	36	9.55 434	39	0.44 566	9.97 376	5	17
44	9.52 846	35	9.55 474	40	0.44 526	9.97 372	4	16
45	9.52 881	35	9.55 514	40	0.44 486	9.97 367	5	15
46	9.52 916	35	9.55 554	40	0.44 446	9.97 363	4	14
47	9.52 951	35	9.55 593	39	0.44 407	9.97 358	5	13
48	9.52 986	35	9.55 633	40	0.44 367	9.97 353	5	12
49	9.53 021	35	9.55 673	40	0.44 327	9.97 349	4	11
50	9.53 056	35	9.55 712	39	0.44 288	9.97 344	5	10
51	9.53 092	36	9.55 752	40	0.44 248	9.97 340	4	9
52	9.53 126	34	9.55 791	39	0.44 209	9.97 335	5	8
53	9.53 161	35	9.55 831	40	0.44 169	9.97 331	4	7
54	9.53 196	35	9.55 870	39	0.44 130	9.97 326	5	6
55	9.53 231	35	9.55 910	40	0.44 090	9.97 322	4	5
56	9.53 266	35	9.55 949	39	0.44 051	9.97 317	5	4
57	9.53 301	35	9.55 989	40	0.44 011	9.97 312	5	3
58	9.53 336	35	9.56 028	39	0.43 972	9.97 308	4	2
59	9.53 370	34	9.56 067	39	0.43 933	9.97 303	5	1
60	9.53 405	35	9.56 107	40	0.43 893	9.97 299	4	0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	'

P P

	41	40	39
1	0.7	0.7	0.6
2	1.4	1.3	1.3
3	2.0	2.0	2.0
4	2.7	2.7	2.6
5	3.4	3.3	3.2
6	4.1	4.0	3.9
7	4.8	4.7	4.6
8	5.5	5.3	5.2
9	6.2	6.0	5.8
10	6.8	6.7	6.5
20	13.7	13.3	13.0
30	20.5	20.0	19.5
40	27.3	26.7	26.0
50	34.2	33.3	32.5

	37	36	35
1	0.6	0.6	0.6
2	1.2	1.2	1.2
3	1.8	1.8	1.8
4	2.5	2.4	2.3
5	3.1	3.0	2.9
6	3.7	3.6	3.5
7	4.3	4.2	4.1
8	4.9	4.8	4.7
9	5.6	5.4	5.2
10	6.2	6.0	5.8
20	12.3	12.0	11.7
30	18.5	18.0	17.5
40	24.7	24.0	23.3
50	30.8	30.0	29.2

	34	5	4
1	0.6	0.1	0.1
2	1.1	0.2	0.1
3	1.7	0.2	0.2
4	2.3	0.3	0.3
5	2.8	0.4	0.3
6	3.4	0.5	0.4
7	4.0	0.6	0.5
8	4.5	0.7	0.5
9	5.1	0.8	0.6
10	5.7	0.8	0.7
20	11.3	1.7	1.3
30	17.0	2.5	2.0
40	22.7	3.3	2.7
50	28.3	4.2	3.3

	5/41	5/40	5/39
0			
1	4.1	4.0	3.9
2	12.3	12.0	11.7
3	20.5	20.0	19.5
4	28.7	28.0	27.3
5	36.9	36.0	35.1

	4/41	4/40	4/39
0			
1	5.1	5.0	4.9
2	15.4	15.0	14.6
3	25.6	25.0	24.4
4	35.9	35.0	34.1

P P

′	L Sin	d	L Tan	c d	L Cot	L Cos	d	
0	9.53 405		9.56 107		0.43 893	9.97 299		60
		35		39			5	
1	9.53 440		9.56 146		0.43 854	9.97 294		59
		35		39			5	
2	9.53 475		9.56 185		0.43 815	9.97 289		58
		34		39			4	
3	9.53 509		9.56 224		0.43 776	9.97 285		57
		35		40			5	
4	9.53 544		9.56 264		0.43 736	9.97 280		56
		34		39			4	
5	9.53 578		9.56 303		0.43 697	9.97 276		55
		35		39			5	
6	9.53 613		9.56 342		0.43 658	9.97 271		54
		34		39			5	
7	9.53 647		9.56 381		0.43 619	9.97 266		53
		35		39			4	
8	9.53 682		9.56 420		0.43 580	9.97 262		52
		34		39			5	
9	9.53 716		9.56 459		0.43 541	9.97 257		51
		35		39			5	
10	9.53 751		9.56 498		0.43 502	9.97 252		50
		34		39			4	
11	9.53 785		9.56 537		0.43 463	9.97 248		49
		34		39			5	
12	9.53 819		9.56 576		0.43 424	9.97 243		48
		34		39			5	
13	9.53 854		9.56 615		0.43 385	9.97 238		47
		34		39			4	
14	9.53 888		9.56 654		0.43 346	9.97 234		46
		34		39			5	
15	9.53 922		9.56 693		0.43 307	9.97 229		45
		35		39			5	
16	9.53 957		9.56 732		0.43 268	9.97 224		44
		34		39			4	
17	9.53 991		9.56 771		0.43 229	9.97 220		43
		34		39			5	
18	9.54 025		9.56 810		0.43 190	9.97 215		42
		34		39			5	
19	9.54 059		9.56 849		0.43 151	9.97 210		41
		34		38			4	
20	9.54 093		9.56 887		0.43 113	9.97 206		40
		34		39			5	
21	9.54 127		9.56 926		0.43 074	9.97 201		39
		34		39			5	
22	9.54 161		9.56 965		0.43 035	9.97 196		38
		34		39			4	
23	9.54 195		9.57 004		0.42 996	9.97 192		37
		34		38			5	
24	9.54 229		9.57 042		0.42 958	9.97 187		36
		34		39			5	
25	9.54 263		9.57 081		0.42 919	9.97 182		35
		34		39			4	
26	9.54 297		9.57 120		0.42 880	9.97 178		34
		34		38			5	
27	9.54 331		9.57 158		0.42 842	9.97 173		33
		34		39			5	
28	9.54 365		9.57 197		0.42 803	9.97 168		32
		34		38			5	
29	9.54 399		9.57 235		0.42 765	9.97 163		31
		34		39			4	
30	9.54 433		9.57 274		0.42 726	9.97 159		30
		33		38			5	
31	9.54 466		9.57 312		0.42 688	9.97 154		29
		34		39			5	
32	9.54 500		9.57 351		0.42 649	9.97 149		28
		34		38			4	
33	9.54 534		9.57 389		0.42 611	9.97 145		27
		35		39			5	
34	9.54 567		9.57 428		0.42 572	9.97 140		26
		34		38			5	
35	9.54 601		9.57 466		0.42 534	9.97 135		25
		34		38			5	
36	9.54 635		9.57 504		0.42 496	9.97 130		24
		33		39			4	
37	9.54 668		9.57 543		0.42 457	9.97 126		23
		34		38			5	
38	9.54 702		9.57 581		0.42 419	9.97 121		22
		33		38			5	
39	9.54 735		9.57 619		0.42 381	9.97 116		21
		34		39			5	
40	9.54 769		9.57 658		0.42 342	9.97 111		20
		33		38			5	
41	9.54 802		9.57 696		0.42 304	9.97 107		19
		34		38			5	
42	9.54 836		9.57 734		0.42 266	9.97 102		18
		33		38			5	
43	9.54 869		9.57 772		0.42 228	9.97 097		17
		34		38			5	
44	9.54 903		9.57 810		0.42 190	9.97 092		16
		33		39			5	
45	9.54 936		9.57 849		0.42 151	9.97 087		15
		33		38			4	
46	9.54 969		9.57 887		0.42 113	9.97 083		14
		34		38			5	
47	9.55 003		9.57 925		0.42 075	9.97 078		13
		33		38			5	
48	9.55 036		9.57 963		0.42 037	9.97 073		12
		33		38			5	
49	9.55 069		9.58 001		0.41 999	9.97 068		11
		33		38			5	
50	9.55 102		9.58 039		0.41 961	9.97 063		10
		34		38			4	
51	9.55 136		9.58 077		0.41 923	9.97 059		9
		33		38			5	
52	9.55 169		9.58 115		0.41 885	9.97 054		8
		33		38			5	
53	9.55 202		9.58 153		0.41 847	9.97 049		7
		33		38			5	
54	9.55 235		9.58 191		0.41 809	9.97 044		6
		33		38			5	
55	9.55 268		9.58 229		0.41 771	9.97 039		5
		33		38			4	
56	9.55 301		9.58 267		0.41 733	9.97 035		4
		33		37			5	
57	9.55 334		9.58 304		0.41 696	9.97 030		3
		33		38			5	
58	9.55 367		9.58 342		0.41 658	9.97 025		2
		33		38			5	
59	9.55 400		9.58 380		0.41 620	9.97 020		1
		33		38			5	
60	9.55 433		9.58 418		0.41 582	9.97 015		0
′	L Cos	d	L Cot	c d	L Tan	L Sin	d	′

P	P	
	40	39	38
1	0.7	0.6	0.6
2	1.3	1.3	1.3
3	2.0	2.0	1.9
4	2.7	2.6	2.5
5	3.3	3.2	3.2
6	4.0	3.9	3.8
7	4.7	4.6	4.4
8	5.3	5.2	5.1
9	6.0	5.8	5.7
10	6.7	6.5	6.3
20	13.3	13.0	12.7
30	20.0	19.5	19.0
40	26.7	26.0	25.3
50	33.3	32.5	31.7
	37	35	34
1	0.6	0.6	0.6
2	1.2	1.2	1.1
3	1.8	1.8	1.7
4	2.5	2.3	2.3
5	3.1	2.9	2.8
6	3.7	3.5	3.4
7	4.3	4.1	4.0
8	4.9	4.7	4.5
9	5.6	5.2	5.1
10	6.2	5.8	5.7
20	12.3	11.7	11.3
30	18.5	17.5	17.0
40	24.7	23.3	22.7
50	30.8	29.2	28.3
	33	5	4
1	0.6	0.1	0.1
2	1.1	0.2	0.1
3	1.6	0.2	0.2
4	2.2	0.3	0.3
5	2.8	0.4	0.3
6	3.3	0.5	0.4
7	3.8	0.6	0.5
8	4.4	0.7	0.5
9	5.0	0.8	0.6
10	5.5	0.8	0.7
20	11.0	1.7	1.3
30	16.5	2.5	2.0
40	22.0	3.3	2.7
50	27.5	4.2	3.3
	5	5	5
	40	39	38
0	4.0	3.9	3.8
1	12.0	11.7	11.4
2	20.0	19.5	19.0
3	28.0	27.3	26.6
4	36.0	35.1	34.2
5			
	5	4	4
	37	39	38
0	3.7	4.9	4.8
1	11.1	14.6	14.3
2	18.5	24.4	23.8
3	25.9	34.1	33.3
4	33.3	—	—
5			

P	P

′	L Sin	d	L Tan	cd	L Cot	L Cos	d	′
0	9·55 433		9·58 418		0·41 582	9·97 015		60
		33		37			5	
1	9·55 466		9·58 455		0·41 545	9·97 010		59
		33		38			5	
2	9·55 499		9·58 493		0·41 507	9·97 005	4	58
		33		38				
3	9·55 532		9·58 531		0·41 469	9·97 001	5	57
		32		38				
4	9·55 564		9·58 569		0·41 431	9·96 996	5	56
		33		37				
5	9·55 597		9·58 606		0·41 394	9·96 991	5	55
		33		38				
6	9·55 630		9·58 644		0·41 356	9·96 986	5	54
		33		37				
7	9·55 663		9·58 681		0·41 319	9·96 981	5	53
		32		38				
8	9·55 695		9·58 719		0·41 281	9·96 976	5	52
		33		38				
9	9·55 728		9·58 757		0·41 243	9·96 971	5	51
		33		37				
10	9·55 761		9·58 794		0·41 206	9·96 966	5	50
		32		38				
11	9·55 793		9·58 832		0·41 168	9·96 962	4	49
		33		37				
12	9·55 826		9·58 869		0·41 131	9·96 957	5	48
		32		38				
13	9·55 858		9·58 907		0·41 093	9·96 952	5	47
		33		37				
14	9·55 891		9·58 944		0·41 056	9·96 947	5	46
		32		37				
15	9·55 923		9·58 981		0·41 019	9·96 942	5	45
		33		38				
16	9·55 956		9·59 019		0·40 981	9·96 937	5	44
		32		37				
17	9·55 988		9·59 056		0·40 944	9·96 932	5	43
		33		38				
18	9·56 021		9·59 094		0·40 906	9·96 927	5	42
		32		37				
19	9·56 053		9·59 131		0·40 869	9·96 922	5	41
		32		37				
20	9·56 085		9·59 168		0·40 832	9·96 917	5	40
		33		37				
21	9·56 118		9·59 205		0·40 795	9·96 912	5	39
		32		38				
22	9·56 150		9·59 243		0·40 757	9·96 907	4	38
		32		37				
23	9·56 182		9·59 280		0·40 720	9·96 903	5	37
		33		37				
24	9·56 215		9·59 317		0·40 683	9·96 898	5	36
		32		37				
25	9·56 247		9·59 354		0·40 646	9·96 893	5	35
		32		37				
26	9·56 279		9·59 391		0·40 609	9·96 888	5	34
		32		38				
27	9·56 311		9·59 429		0·40 571	9·96 883	5	33
		32		37				
28	9·56 343		9·59 466		0·40 534	9·96 878	5	32
		32		37				
29	9·56 375		9·59 503		0·40 497	9·96 873	5	31
		33		37				
30	9·56 408		9·59 540		0·40 460	9·96 868	5	30
		32		37				
31	9·56 440		9·59 577		0·40 423	9·96 863	5	29
		32		37				
32	9·56 472		9·59 614		0·40 386	9·96 858	5	28
		32		37				
33	9·56 504		9·59 651		0·40 349	9·96 853	5	27
		32		37				
34	9·56 536		9·59 688		0·40 312	9·96 848	5	26
		32		37				
35	9·56 568		9·59 725		0·40 275	9·96 843	5	25
		31		37				
36	9·56 599		9·59 762		0·40 238	9·96 838	5	24
		32		37				
37	9·56 631		9·59 799		0·40 201	9·96 833	5	23
		32		36				
38	9·56 663		9·59 835		0·40 165	9·96 828	5	22
		32		37				
39	9·56 695		9·59 872		0·40 128	9·96 823	5	21
		32		37				
40	9·56 727		9·59 909		0·40 091	9·96 818	5	20
		32		37				
41	9·56 759		9·59 946		0·40 054	9·96 813	5	19
		31		37				
42	9·56 790		9·59 983		0·40 017	9·96 808	5	18
		32		36				
43	9·56 822		9·60 019		0·39 981	9·96 803	5	17
		32		37				
44	9·56 854		9·60 056		0·39 944	9·96 798	5	16
		32		37				
45	9·56 886		9·60 093		0·39 907	9·96 793	5	15
		31		37				
46	9·56 917		9·60 130		0·39 870	9·96 788	5	14
		32		36				
47	9·56 949		9·60 166		0·39 834	9·96 783	5	13
		31		37				
48	9·56 980		9·60 203		0·39 797	9·96 778	6	12
		32		37				
49	9·57 012		9·60 240		0·39 760	9·96 772	5	11
		32		36				
50	9·57 044		9·60 276		0·39 724	9·96 767	5	10
		31		37				
51	9·57 075		9·60 313		0·39 687	9·96 762	5	9
		32		36				
52	9·57 107		9·60 349		0·39 651	9·96 757	5	8
		31		37				
53	9·57 138		9·60 386		0·39 614	9·96 752	5	7
		31		36				
54	9·57 169		9·60 422		0·39 578	9·96 747	5	6
		32		37				
55	9·57 201		9·60 459		0·39 541	9·96 742	5	5
		31		36				
56	9·57 232		9·60 495		0·39 505	9·96 737	5	4
		32		37				
57	9·57 264		9·60 532		0·39 468	9·96 732	5	3
		31		36				
58	9·57 295		9·60 568		0·39 432	9·96 727	5	2
		31		37				
59	9·57 326		9·60 605		0·39 395	9·96 722	5	1
		32		36				
60	9·57 358		9·60 641		0·39 359	9·96 717	5	0
	L Cos	d	L Cot	cd	L Tan	L Sin	d	′

P P			
	38	37	36
1	0.6	0.6	0.6
2	1.3	1.2	1.2
3	1.9	1.8	1.8
4	2.5	2.5	2.4
5	3.2	3.1	3.0
6	3.8	3.7	3.6
7	4.4	4.3	4.2
8	5.1	4.9	4.8
9	5.7	5.6	5.4
10	6.3	6.2	6.0
20	12.7	12.3	12.0
30	19.0	18.5	18.0
40	25.3	24.7	24.0
50	31.7	30.8	30.0
	33	32	31
1	0.6	0.5	0.5
2	1.1	1.1	1.0
3	1.6	1.6	1.6
4	2.2	2.1	2.1
5	2.8	2.7	2.6
6	3.3	3.2	3.1
7	3.8	3.7	3.6
8	4.4	4.3	4.1
9	5.0	4.8	4.6
10	5.5	5.3	5.2
20	11.0	10.7	10.3
30	16.5	16.0	15.5
40	22.0	21.3	20.7
50	27.5	26.7	25.8
	6	5	4
1	0.1	0.1	0.1
2	0.2	0.2	0.1
3	0.3	0.2	0.2
4	0.4	0.3	0.3
5	0.5	0.4	0.3
6	0.6	0.5	0.4
7	0.7	0.6	0.5
8	0.8	0.7	0.5
9	0.9	0.8	0.6
10	1.0	0.8	0.7
20	2.0	1.7	1.3
30	3.0	2.5	2.0
40	4.0	3.3	2.7
50	5.0	4.2	3.3

	6	5	5
	37	38	37
0	3.1	3.8	3.7
1	9.2	11.4	11.1
2	15.4	19.0	18.5
3	21.6	26.6	25.9
4	27.8	34.2	33.3
5	33.9	—	—
6			
	5	4	4
	36	38	37
0	3.6	4.8	4.6
1	10.8	14.2	13.9
2	18.0	23.8	23.1
3	25.2	33.2	32.4
4	32.4	—	—
5			

P P

′	L Sin	d	L Tan	c d	L Cot	L Cos	d	′
0	9.57 358		9.60 641		0.39 359	9.96 717		60
		31		36			6	
1	9.57 389		9.60 677		0.39 323	9.96 711		59
		31		37			5	
2	9.57 420		9.60 714		0.39 286	9.96 706		58
		31		36			5	
3	9.57 451		9.60 750		0.39 250	9.96 701		57
		31		36			5	
4	9.57 482		9.60 786		0.39 214	9.96 696		56
		32		37			5	
5	9.57 514		9.60 823		0.39 177	9.96 691		55
		31		36			5	
6	9.57 545		9.60 859		0.39 141	9.96 686		54
		31		36			5	
7	9.57 576		9.60 895		0.39 105	9.96 681		53
		31		36			5	
8	9.57 607		9.60 931		0.39 069	9.96 676		52
		31		36			6	
9	9.57 638		9.60 967		0.39 033	9.96 670		51
		31		37			5	
10	9.57 669		9.61 004		0.38 996	9.96 665		50
		31		36			5	
11	9.57 700		9.61 040		0.38 960	9.96 660		49
		31		35			5	
12	9.57 731		9.61 076		0.38 924	9.96 655		48
		31		36			5	
13	9.57 762		9.61 112		0.38 888	9.96 650		47
		31		36			5	
14	9.57 793		9.61 148		0.38 852	9.96 645		46
		31		36			5	
15	9.57 824		9.61 184		0.38 816	9.96 640		45
		31		36			6	
16	9.57 855		9.61 220		0.38 780	9.96 634		44
		30		36			5	
17	9.57 885		9.61 256		0.38 744	9.96 629		43
		31		36			5	
18	9.57 916		9.61 292		0.38 708	9.96 624		42
		31		36			5	
19	9.57 947		9.61 328		0.38 672	9.96 619		41
		31		36			5	
20	9.57 978		9.61 364		0.38 636	9.96 614		40
		30		36			5	
21	9.58 008		9.61 400		0.38 600	9.96 608		39
		31		36			5	
22	9.58 039		9.61 436		0.38 564	9.96 603		38
		31		36			5	
23	9.58 070		9.61 472		0.38 528	9.96 598		37
		31		36			5	
24	9.58 101		9.61 508		0.38 492	9.96 593		36
		30		36			5	
25	9.58 131		9.61 544		0.38 456	9.96 588		35
		31		35			6	
26	9.58 162		9.61 579		0.38 421	9.96 582		34
		30		36			5	
27	9.58 192		9.61 615		0.38 385	9.96 577		33
		31		36			5	
28	9.58 223		9.61 651		0.38 349	9.96 572		32
		30		36			5	
29	9.58 253		9.61 687		0.38 313	9.96 567		31
		31		35			5	
30	9.58 284		9.61 722		0.38 278	9.96 562		30
		30		36			6	
31	9.58 314		9.61 758		0.38 242	9.96 556		29
		31		36			5	
32	9.58 345		9.61 794		0.38 206	9.96 551		28
		30		36			5	
33	9.58 375		9.61 830		0.38 170	9.96 546		27
		31		35			5	
34	9.58 406		9.61 865		0.38 135	9.96 541		26
		30		36			5	
35	9.58 436		9.61 901		0.38 099	9.96 535		25
		31		35			5	
36	9.58 467		9.61 936		0.38 064	9.96 530		24
		30		36			5	
37	9.58 497		9.61 972		0.38 028	9.96 525		23
		30		36			5	
38	9.58 527		9.62 008		0.37 992	9.96 520		22
		30		35			6	
39	9.58 557		9.62 043		0.37 957	9.96 514		21
		31		36			5	
40	9.58 588		9.62 079		0.37 921	9.96 509		20
		30		35			5	
41	9.58 618		9.62 114		0.37 886	9.96 504		19
		30		36			6	
42	9.58 648		9.62 150		0.37 850	9.96 498		18
		30		35			5	
43	9.58 678		9.62 185		0.37 815	9.96 493		17
		31		36			5	
44	9.58 709		9.62 221		0.37 779	9.96 488		16
		30		35			5	
45	9.58 739		9.62 256		0.37 744	9.96 483		15
		30		36			6	
46	9.58 769		9.62 292		0.37 708	9.96 477		14
		30		35			5	
47	9.58 799		9.62 327		0.37 673	9.96 472		13
		30		35			5	
48	9.58 829		9.62 362		0.37 638	9.96 467		12
		30		36			6	
49	9.58 859		9.62 398		0.37 602	9.96 461		11
		30		35			5	
50	9.58 889		9.62 433		0.37 567	9.96 456		10
		30		35			5	
51	9.58 919		9.62 468		0.37 532	9.96 451		9
		30		36			6	
52	9.58 949		9.62 504		0.37 496	9.96 445		8
		30		35			5	
53	9.58 979		9.62 539		0.37 461	9.96 440		7
		30		35			5	
54	9.59 009		9.62 574		0.37 426	9.96 435		6
		30		35			6	
55	9.59 039		9.62 609		0.37 391	9.96 429		5
		30		36			5	
56	9.59 069		9.62 645		0.37 355	9.96 424		4
		29		35			5	
57	9.59 098		9.62 680		0.37 320	9.96 419		3
		30		35			6	
58	9.59 128		9.62 715		0.37 285	9.96 413		2
		30		35			5	
59	9.59 158		9.62 750		0.37 250	9.96 408		1
		30		35			5	
60	9.59 188		9.62 785		0.37 215	9.96 403		0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	′

P	P	
	37	36	35
1	0.6	0.6	0.6
2	1.2	1.2	1.2
3	1.8	1.8	1.8
4	2.5	2.4	2.3
5	3.1	3.0	2.9
6	3.7	3.6	3.5
7	4.3	4.2	4.1
8	4.9	4.8	4.7
9	5.6	5.4	5.2
10	6.2	6.0	5.8
20	12.3	12.0	11.7
30	18.5	18.0	17.5
40	24.7	24.0	23.3
50	30.8	30.0	29.2
	32	31	30
1	0.5	0.5	0.5
2	1.1	1.0	1.0
3	1.6	1.6	1.5
4	2.1	2.1	2.0
5	2.7	2.6	2.5
6	3.2	3.1	3.0
7	3.7	3.6	3.5
8	4.3	4.1	4.0
9	4.8	4.6	4.5
10	5.3	5.2	5.0
20	10.7	10.3	10.0
30	16.0	15.5	15.0
40	21.3	20.7	20.0
50	26.7	25.8	25.0
	29	6	5
1	0.5	0.1	0.1
2	1.0	0.2	0.2
3	1.4	0.3	0.2
4	1.9	0.4	0.3
5	2.4	0.5	0.4
6	2.9	0.6	0.5
7	3.4	0.7	0.6
8	3.9	0.8	0.7
9	4.4	0.9	0.8
10	4.8	1.0	0.8
20	9.7	2.0	1.7
30	14.5	3.0	2.5
40	19.3	4.0	3.3
50	24.2	5.0	4.2

	6 / 36	6 / 35
0		
1	3.0	2.9
2	9.0	8.8
3	15.0	14.6
4	21.0	20.4
5	27.0	26.2
6	33.0	32.1

	5 / 37	5 / 36	5 / 35
0			
1	3.7	3.6	3.5
2	11.1	10.8	10.5
3	18.5	18.0	17.5
4	25.9	25.2	24.5
5	33.3	32.4	31.5

23°

*118° 208° *293°

′	L Sin	d	L Tan	c d	L Cot	L Cos	d
0	9.59 188		9.62 785		0.37 215	9.96 403	
		30		35			6
1	9.59 218		9.62 820		0.37 180	9.96 397	
		29		35			5
2	9.59 247		9.62 855		0.37 145	9.96 392	
		30		35			6
3	9.59 277		9.62 890		0.37 110	9.96 387	
		30		36			5
4	9.59 307		9.62 926		0.37 074	9.96 381	
		29		35			6
5	9.59 336		9.62 961		0.37 039	9.96 376	
		30		35			5
6	9.59 366		9.62 996		0.37 004	9.96 370	
		30		35			6
7	9.59 396		9.63 031		0.36 969	9.96 365	
		29		35			5
8	9.59 425		9.63 066		0.36 934	9.96 360	
		30		35			6
9	9.59 455		9.63 101		0.36 899	9.96 354	
		29		34			5
10	9.59 484		9.63 135		0.36 865	9.96 349	
		30		35			6
11	9.59 514		9.63 170		0.36 830	9.96 343	
		29		35			5
12	9.59 543		9.63 205		0.36 795	9.96 338	
		30		35			5
13	9.59 573		9.63 240		0.36 760	9.96 333	
		29		35			6
14	9.59 602		9.63 275		0.36 725	9.96 327	
		30		35			5
15	9.59 632		9.63 310		0.36 690	9.96 322	
		29		35			6
16	9.59 661		9.63 345		0.36 655	9.96 316	
		29		34			5
17	9.59 690		9.63 379		0.36 621	9.96 311	
		30		35			6
18	9.59 720		9.63 414		0.36 586	9.96 305	
		29		35			5
19	9.59 749		9.63 449		0.36 551	9.96 300	
		29		35			6
20	9.59 778		9.63 484		0.36 516	9.96 294	
		30		34			5
21	9.59 808		9.63 519		0.36 481	9.96 289	
		29		35			5
22	9.59 837		9.63 553		0.36 447	9.96 284	
		29		35			6
23	9.59 866		9.63 588		0.36 412	9.96 278	
		29		34			5
24	9.59 895		9.63 623		0.36 377	9.96 273	
		29		35			6
25	9.59 924		9.63 657		0.36 343	9.96 267	
		30		34			6
26	9.59 954		9.63 692		0.36 308	9.96 262	
		29		35			5
27	9.59 983		9.63 726		0.36 274	9.96 256	
		29		35			6
28	9.60 012		9.63 761		0.36 239	9.96 251	
		29		34			5
29	9.60 041		9.63 796		0.36 204	9.96 245	
		29		35			6
30	9.60 070		9.63 830		0.36 170	9.96 240	
		29		34			5
31	9.60 099		9.63 865		0.36 135	9.96 234	
		29		35			6
32	9.60 128		9.63 899		0.36 101	9.96 229	
		29		34			5
33	9.60 157		9.63 934		0.36 066	9.96 223	
		29		35			6
34	9.60 186		9.63 968		0.36 032	9.96 218	
		29		34			5
35	9.60 215		9.64 003		0.35 997	9.96 212	
		29		35			6
36	9.60 244		9.64 037		0.35 963	9.96 207	
		29		34			5
37	9.60 273		9.64 072		0.35 928	9.96 201	
		29		34			6
38	9.60 302		9.64 106		0.35 894	9.96 196	
		29		34			6
39	9.60 331		9.64 140		0.35 860	9.96 190	
		28		35			5
40	9.60 359		9.64 175		0.35 825	9.96 185	
		29		34			6
41	9.60 388		9.64 209		0.35 791	9.96 179	
		29		34			5
42	9.60 417		9.64 243		0.35 757	9.96 174	
		29		35			6
43	9.60 446		9.64 278		0.35 722	9.96 168	
		28		34			6
44	9.60 474		9.64 312		0.35 688	9.96 162	
		29		34			5
45	9.60 503		9.64 346		0.35 654	9.96 157	
		29		35			6
46	9.60 532		9.64 381		0.35 619	9.96 151	
		29		34			5
47	9.60 561		9.64 415		0.35 585	9.96 146	
		28		34			6
48	9.60 589		9.64 449		0.35 551	9.96 140	
		29		34			6
49	9.60 618		9.64 483		0.35 517	9.96 135	
		28		34			6
50	9.60 646		9.64 517		0.35 483	9.96 129	
		29		35			6
51	9.60 675		9.64 552		0.35 448	9.96 123	
		29		34			5
52	9.60 704		9.64 586		0.35 414	9.96 118	
		28		34			6
53	9.60 732		9.64 620		0.35 380	9.96 112	
		29		34			5
54	9.60 761		9.64 654		0.35 346	9.96 107	
		28		34			6
55	9.60 789		9.64 688		0.35 312	9.96 101	
		29		34			6
56	9.60 818		9.64 722		0.35 278	9.96 095	
		28		34			5
57	9.60 846		9.64 756		0.35 244	9.96 090	
		29		34			6
58	9.60 875		9.64 790		0.35 210	9.96 084	
		28		34			5
59	9.60 903		9.64 824		0.35 176	9.96 079	
		28		34			6
60	9.60 931		9.64 858		0.35 142	9.96 073	
	L Cos	d	L Cot	c d	L Tan	L Sin	d

	P	P
60		
59	36	35	34
58	1 0.6	0.6	0.6
57	2 1.2	1.2	1.1
56	3 1.8	1.8	1.7
55	4 2.4	2.3	2.3
54	5 3.0	2.9	2.8
53	6 3.6	3.5	3.4
52	7 4.2	4.1	4.0
51	8 4.8	4.7	4.5
50	9 5.4	5.2	5.1
49	10 6.0	5.8	5.7
48	20 12.0	11.7	11.3
47	30 18.0	17.5	17.0
46	40 24.0	23.3	22.7
45	50 30.0	29.2	28.3
44			
43	30	29	28
42	1 0.5	0.5	0.5
41	2 1.0	1.0	0.9
40	3 1.5	1.4	1.4
39	4 2.0	1.9	1.9
38	5 2.5	2.4	2.3
37	6 3.0	2.9	2.8
36	7 3.5	3.4	3.3
35	8 4.0	3.9	3.7
34	9 4.5	4.4	4.2
33	10 5.0	4.8	4.7
32	20 10.0	9.7	9.3
31	30 15.0	14.5	14.0
30	40 20.0	19.3	18.7
29	50 25.0	24.2	23.3
28			
27	6	5
26	1 0.1	0.1
25	2 0.2	0.2
24	3 0.3	0.2
23	4 0.4	0.3
22	5 0.5	0.4
21	6 0.6	0.5
20	7 0.7	0.6
19	8 0.8	0.7
18	9 0.9	0.8
17	10 1.0	0.8
16	20 2.0	1.7
15	30 3.0	2.5
14	40 4.0	3.3
13	50 5.0	4.2
12		
11	6	6	6
10	36	35	34
9	0			
8	1 3.0	2.9	2.8
7	2 9.0	8.8	8.5
6	3 15.0	14.6	14.2
5	4 21.0	20.4	19.8
4	5 27.0	26.2	25.5
3	6 33.0	32.1	31.2
2			
1	5	5
0	35	34
	0		
	1 3.5	3.4
	2 10.5	10.2
	3 17.5	17.0
	4 24.5	23.8
	5 31.5	30.6
	P	P

′	L Sin	d	L Tan	c d	L Cot	L Cos	d	′
0	9.60 931		9.64 858		0.35 142	9.96 073		60
		29		34			6	
1	9.60 960		9.64 892		0.35 108	9.96 067		59
		28		34			5 6	
2	9.60 988		9.64 926		0.35 074	9.96 062		58
		28		34			6	
3	9.61 016		9.64 960		0.35 040	9.96 056		57
		29		34				
4	9.61 045		9.64 994		0.35 006	9.96 050		56
		28		34			5 6	
5	9.61 073		9.65 028		0.34 972	9.96 045		55
		28		34			5 6	
6	9.61 101		9.65 062		0.34 938	9.96 039		54
		28		34			5	
7	9.61 129		9.65 096		0.34 904	9.96 034		53
		29		34			6	
8	9.61 158		9.65 130		0.34 870	9.96 028		52
		28		34			6 6	
9	9.61 186		9.65 164		0.34 836	9.96 022		51
		28		33			5	
10	9.61 214		9.65 197		0.34 803	9.96 017		50
		28		34			6	
11	9.61 242		9.65 231		0.34 769	9.96 011		49
		28		34			6	
12	9.61 270		9.65 265		0.34 735	9.96 005		48
		28		34			5 6	
13	9.61 298		9.65 299		0.34 701	9.96 000		47
		28		34			6	
14	9.61 326		9.65 333		0.34 667	9.95 994		46
		28		33			6	
15	9.61 354		9.65 366		0.34 634	9.95 988		45
		28		34			6	
16	9.61 382		9.65 400		0.34 600	9.95 982		44
		29		34			5	
17	9.61 411		9.65 434		0.34 566	9.95 977		43
		27		33			6	
18	9.61 438		9.65 467		0.34 533	9.95 971		42
		28		34			6	
19	9.61 466		9.65 501		0.34 499	9.95 965		41
		28		34			5 6	
20	9.61 494		9.65 535		0.34 465	9.95 960		40
		28		33			6	
21	9.61 522		9.65 568		0.34 432	9.95 954		39
		28		34			6	
22	9.61 550		9.65 602		0.34 398	9.95 948		38
		28		34			6	
23	9.61 578		9.65 636		0.34 364	9.95 942		37
		28		33			5	
24	9.61 606		9.65 669		0.34 331	9.95 937		36
		28		34			6	
25	9.61 634		9.65 703		0.34 297	9.95 931		35
		28		33			6	
26	9.61 662		9.65 736		0.34 264	9.95 925		34
		27		34			5	
27	9.61 689		9.65 770		0.34 230	9.95 920		33
		28		33			6	
28	9.61 717		9.65 803		0.34 197	9.95 914		32
		28		34			6	
29	9.61 745		9.65 837		0.34 163	9.95 908		31
		28		33			6	
30	9.61 773		9.65 870		0.34 130	9.95 902		30
		27		34			5	
31	9.61 800		9.65 904		0.34 096	9.95 897		29
		28		33			6	
32	9.61 828		9.65 937		0.34 063	9.95 891		28
		28		34			6	
33	9.61 856		9.65 971		0.34 029	9.95 885		27
		27		33			6	
34	9.61 883		9.66 004		0.33 996	9.95 879		26
		28		34			6	
35	9.61 911		9.66 038		0.33 962	9.95 873		25
		28		33			5 6	
36	9.61 939		9.66 071		0.33 929	9.95 868		24
		27		33			6	
37	9.61 966		9.66 104		0.33 896	9.95 862		23
		28		34			6	
38	9.61 994		9.66 138		0.33 862	9.95 856		22
		27		33			6	
39	9.62 021		9.66 171		0.33 829	9.95 850		21
		28		33			6	
40	9.62 049		9.66 204		0.33 796	9.95 844		20
		27		34			5	
41	9.62 076		9.66 238		0.33 762	9.95 839		19
		28		33			6	
42	9.62 104		9.66 271		0.33 729	9.95 833		18
		27		33			6	
43	9.62 131		9.66 304		0.33 696	9.95 827		17
		28		33			6	
44	9.62 159		9.66 337		0.33 663	9.95 821		16
		27		34			6	
45	9.62 186		9.66 371		0.33 629	9.95 815		15
		28		33			5	
46	9.62 214		9.66 404		0.33 596	9.95 810		14
		27		33			6	
47	9.62 241		9.66 437		0.33 563	9.95 804		13
		27		33			6	
48	9.62 268		9.66 470		0.33 530	9.95 798		12
		28		33			6	
49	9.62 296		9.66 503		0.33 497	9.95 792		11
		27		34			6	
50	9.62 323		9.66 537		0.33 463	9.95 786		10
		27		33			6	
51	9.62 350		9.66 570		0.33 430	9.95 780		9
		27		33			5	
52	9.62 377		9.66 603		0.33 397	9.95 775		8
		28		33			6	
53	9.62 405		9.66 636		0.33 364	9.95 769		7
		27		33			6	
54	9.62 432		9.66 669		0.33 331	9.95 763		6
		27		33			6	
55	9.62 459		9.66 702		0.33 298	9.95 757		5
		27		33			6	
56	9.62 486		9.66 735		0.33 265	9.95 751		4
		27		33			6	
57	9.62 513		9.66 768		0.33 232	9.95 745		3
		28		33			6	
58	9.62 541		9.66 801		0.33 199	9.95 739		2
		27		33			6	
59	9.62 568		9.66 834		0.33 166	9.95 733		1
		27		33			5	
60	9.62 595		9.66 867		0.33 133	9.95 728		0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	′

P P

	34	33
1	0.6	0.6
2	1.1	1.1
3	1.7	1.6
4	2.3	2.2
5	2.8	2.8
6	3.4	3.3
7	4.0	3.8
8	4.5	4.4
9	5.1	5.0
10	5.7	5.5
20	11.3	11.0
30	17.0	16.5
40	22.7	22.0
50	28.3	27.5

	29	28	27
1	0.5	0.5	0.4
2	1.0	0.9	0.9
3	1.4	1.4	1.4
4	1.9	1.9	1.8
5	2.4	2.3	2.2
6	2.9	2.8	2.7
7	3.4	3.3	3.2
8	3.9	3.7	3.6
9	4.4	4.2	4.0
10	4.8	4.7	4.5
20	9.7	9.3	9.0
30	14.5	14.0	13.5
40	19.3	18.7	18.0
50	24.2	23.3	22.5

	6	5
1	0.1	0.1
2	0.2	0.2
3	0.3	0.2
4	0.4	0.3
5	0.5	0.4
6	0.6	0.5
7	0.7	0.6
8	0.8	0.7
9	0.9	0.8
10	1.0	0.8
20	2.0	1.7
30	3.0	2.5
40	4.0	3.3
50	5.0	4.2

	6/34	6/33	5/34
0			
1	2.8	2.8	3.4
2	8.5	8.2	10.2
3	14.2	13.8	17.0
4	19.8	19.2	23.8
5	25.5	24.8	30.6
6	31.2	30.2	—

P P

'	L Sin	d	L Tan	c d	L Cot	L Cos	d	'
0	9.62 595	27	9.66 867	33	0.33 133	9.95 728	6	60
1	9.62 622	27	9.66 900	33	0.33 100	9.95 722	6	59
2	9.62 649	27	9.66 933	33	0.33 067	9.95 716	6	58
3	9.62 676	27	9.66 966	33	0.33 034	9.95 710	6	57
4	9.62 703	27	9.66 999	33	0.33 001	9.95 704	6	56
5	9.62 730	27	9.67 032	33	0.32 968	9.95 698	6	55
6	9.62 757	27	9.67 065	33	0.32 935	9.95 692	6	54
7	9.62 784	27	9.67 098	33	0.32 902	9.95 686	6	53
8	9.62 811	27	9.67 131	33	0.32 869	9.95 680	6	52
9	9.62 838	27	9.67 163	32	0.32 837	9.95 674	6	51
10	9.62 865	27	9.67 196	33	0.32 804	9.95 668	5	50
11	9.62 892	26	9.67 229	33	0.32 771	9.95 663	6	49
12	9.62 918	27	9.67 262	33	0.32 738	9.95 657	6	48
13	9.62 945	27	9.67 295	33	0.32 705	9.95 651	6	47
14	9.62 972	27	9.67 327	32	0.32 673	9.95 645	6	46
15	9.62 999	27	9.67 360	33	0.32 640	9.95 639	6	45
16	9.63 026	26	9.67 393	33	0.32 607	9.95 633	6	44
17	9.63 052	27	9.67 426	33	0.32 574	9.95 627	6	43
18	9.63 079	27	9.67 458	32	0.32 542	9.95 621	6	42
19	9.63 106	27	9.67 491	33	0.32 509	9.95 615	6	41
20	9.63 133	26	9.67 524	33	0.32 476	9.95 609	6	40
21	9.63 159	27	9.67 556	32	0.32 444	9.95 603	6	39
22	9.63 186	27	9.67 589	33	0.32 411	9.95 597	6	38
23	9.63 213	26	9.67 622	33	0.32 378	9.95 591	6	37
24	9.63 239	27	9.67 654	32	0.32 346	9.95 585	6	36
25	9.63 266	26	9.67 687	33	0.32 313	9.95 579	6	35
26	9.63 292	27	9.67 719	32	0.32 281	9.95 573	6	34
27	9.63 319	26	9.67 752	33	0.32 248	9.95 567	6	33
28	9.63 345	27	9.67 785	33	0.32 215	9.95 561	6	32
29	9.63 372	26	9.67 817	32	0.32 183	9.95 555	6	31
30	9.63 398	27	9.67 850	33	0.32 150	9.95 549	6	30
31	9.63 425	26	9.67 882	32	0.32 118	9.95 543	6	29
32	9.63 451	27	9.67 915	33	0.32 085	9.95 537	6	28
33	9.63 478	26	9.67 947	32	0.32 053	9.95 531	6	27
34	9.63 504	27	9.67 980	33	0.32 020	9.95 525	6	26
35	9.63 531	26	9.68 012	32	0.31 988	9.95 519	6	25
36	9.63 557	26	9.68 044	32	0.31 956	9.95 513	6	24
37	9.63 583	27	9.68 077	33	0.31 923	9.95 507	7	23
38	9.63 610	26	9.68 109	32	0.31 891	9.95 500	6	22
39	9.63 636	26	9.68 142	33	0.31 858	9.95 494	6	21
40	9.63 662	27	9.68 174	32	0.31 826	9.95 488	6	20
41	9.63 689	26	9.68 206	32	0.31 794	9.95 482	6	19
42	9.63 715	26	9.68 239	33	0.31 761	9.95 476	6	18
43	9.63 741	26	9.68 271	32	0.31 729	9.95 470	6	17
44	9.63 767	27	9.68 303	32	0.31 697	9.95 464	6	16
45	9.63 794	26	9.68 336	33	0.31 664	9.95 458	6	15
46	9.63 820	26	9.68 368	32	0.31 632	9.95 452	6	14
47	9.63 846	26	9.68 400	32	0.31 600	9.95 446	6	13
48	9.63 872	26	9.68 432	32	0.31 568	9.95 440	6	12
49	9.63 898	26	9.68 465	33	0.31 535	9.95 434	7	11
50	9.63 924	26	9.68 497	32	0.31 503	9.95 427	6	10
51	9.63 950	26	9.68 529	32	0.31 471	9.95 421	6	9
52	9.63 976	26	9.68 561	32	0.31 439	9.95 415	6	8
53	9.64 002	26	9.68 593	32	0.31 407	9.95 409	6	7
54	9.64 028	26	9.68 626	33	0.31 374	9.95 403	6	6
55	9.64 054	26	9.68 658	32	0.31 342	9.95 397	6	5
56	9.64 080	26	9.68 690	32	0.31 310	9.95 391	7	4
57	9.64 106	26	9.68 722	32	0.31 278	9.95 384	6	3
58	9.64 132	26	9.68 754	32	0.31 246	9.95 378	6	2
59	9.64 158	26	9.68 786	32	0.31 214	9.95 372	6	1
60	9.64 184		9.68 818		0.31 182	9.95 366		0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	'

	P	P
	33	32
1	0.6	0.5
2	1.1	1.1
3	1.6	1.6
4	2.2	2.1
5	2.8	2.7
6	3.3	3.2
7	3.8	3.7
8	4.4	4.3
9	5.0	4.8
10	5.5	5.3
20	11.0	10.7
30	16.5	16.0
40	22.0	21.3
50	27.5	26.7

	27	26
1	0.4	0.4
2	0.9	0.9
3	1.4	1.3
4	1.8	1.7
5	2.2	2.2
6	2.7	2.6
7	3.2	3.0
8	3.6	3.5
9	4.0	3.9
10	4.5	4.3
20	9.0	8.7
30	13.5	13.0
40	18.0	17.3
50	22.5	21.7

	7	6	5
1	0.1	0.1	0.1
2	0.2	0.2	0.2
3	0.4	0.3	0.2
4	0.5	0.4	0.3
5	0.6	0.5	0.4
6	0.7	0.6	0.5
7	0.8	0.7	0.6
8	0.9	0.8	0.7
9	1.0	0.9	0.8
10	1.2	1.0	0.8
20	2.3	2.0	1.7
30	3.5	3.0	2.5
40	4.7	4.0	3.3
50	5.8	5.0	4.2

	7/32	6/32	5/33
0			
1	2.3	2.7	3.3
2	6.9	8.0	9.9
3	11.4	13.3	16.5
4	16.0	18.7	23.1
5	20.6	24.0	29.7
6	25.1	29.3	—
7	29.7	—	—

	P	P

′	L Sin	d	L Tan	c d	L Cot	L Cos	d	
0	9.64 184		9.68 818		0.31 182	9.95 366		60
		26		32			6	
1	9.64 210	26	9.68 850	32	0.31 150	9.95 360	6	59
2	9.64 236	26	9.68 882	32	0.31 118	9.95 354	6	58
3	9.64 262	26	9.68 914	32	0.31 086	9.95 348	6	57
4	9.64 288	25	9.68 946	32	0.31 054	9.95 341	7	56
5	9.64 313	26	9.68 978	32	0.31 022	9.95 335	6	55
6	9.64 339	26	9.69 010	32	0.30 990	9.95 329	6	54
7	9.64 365	26	9.69 042	32	0.30 958	9.95 323	6	53
8	9.64 391	26	9.69 074	32	0.30 926	9.95 317	6	52
9	9.64 417	25	9.69 106	32	0.30 894	9.95 310	7	51
10	9.64 442	26	9.69 138	32	0.30 862	9.95 304	6	50
11	9.64 468	26	9.69 170	32	0.30 830	9.95 298	6	49
12	9.64 494	25	9.69 202	32	0.30 798	9.95 292	6	48
13	9.64 519	26	9.69 234	32	0.30 766	9.95 286	6	47
14	9.64 545	26	9.69 266	32	0.30 734	9.95 279	7	46
15	9.64 571	25	9.69 298	31	0.30 702	9.95 273	6	45
16	9.64 596	26	9.69 329	32	0.30 671	9.95 267	6	44
17	9.64 622	25	9.69 361	32	0.30 639	9.95 261	7	43
18	9.64 647	26	9.69 393	32	0.30 607	9.95 254	7	42
19	9.64 673	25	9.69 425	32	0.30 575	9.95 248	6	41
20	9.64 698	26	9.69 457	31	0.30 543	9.95 242	6	40
21	9.64 724	25	9.69 488	32	0.30 512	9.95 236	6	39
22	9.64 749	26	9.69 520	32	0.30 480	9.95 229	7	38
23	9.64 775	25	9.69 552	32	0.30 448	9.95 223	6	37
24	9.64 800	26	9.69 584	31	0.30 416	9.95 217	6	36
25	9.64 826	25	9.69 615	32	0.30 385	9.95 211	6	35
26	9.64 851	26	9.69 647	32	0.30 353	9.95 204	7	34
27	9.64 877	25	9.69 679	31	0.30 321	9.95 198	6	33
28	9.64 902	25	9.69 710	32	0.30 290	9.95 192	6	32
29	9.64 927	26	9.69 742	32	0.30 258	9.95 185	7	31
30	9.64 953	25	9.69 774	31	0.30 226	9.95 179	6	30
31	9.64 978	25	9.69 805	32	0.30 195	9.95 173	6	29
32	9.65 003	26	9.69 837	31	0.30 163	9.95 167	6	28
33	9.65 029	25	9.69 868	32	0.30 132	9.95 160	7	27
34	9.65 054	25	9.69 900	32	0.30 100	9.95 154	6	26
35	9.65 079	25	9.69 932	31	0.30 068	9.95 148	6	25
36	9.65 104	26	9.69 963	32	0.30 037	9.95 141	7	24
37	9.65 130	25	9.69 995	31	0.30 005	9.95 135	6	23
38	9.65 155	25	9.70 026	32	0.29 974	9.95 129	6	22
39	9.65 180	25	9.70 058	31	0.29 942	9.95 122	7	21
40	9.65 205	25	9.70 089	32	0.29 911	9.95 116	6	20
41	9.65 230	25	9.70 121	31	0.29 879	9.95 110	6	19
42	9.65 255	26	9.70 152	32	0.29 848	9.95 103	7	18
43	9.65 281	25	9.70 184	31	0.29 816	9.95 097	6	17
44	9.65 306	25	9.70 215	32	0.29 785	9.95 090	7	16
45	9.65 331	25	9.70 247	31	0.29 753	9.95 084	6	15
46	9.65 356	25	9.70 278	31	0.29 722	9.95 078	6	14
47	9.65 381	25	9.70 309	32	0.29 691	9.95 071	7	13
48	9.65 406	25	9.70 341	31	0.29 659	9.95 065	6	12
49	9.65 431	25	9.70 372	32	0.29 628	9.95 059	6	11
50	9.65 456	25	9.70 404	31	0.29 596	9.95 052	7	10
51	9.65 481	25	9.70 435	31	0.29 565	9.95 046	6	9
52	9.65 506	25	9.70 466	32	0.29 534	9.95 039	7	8
53	9.65 531	25	9.70 498	31	0.29 502	9.95 033	6	7
54	9.65 556	24	9.70 529	31	0.29 471	9.95 027	6	6
55	9.65 580	25	9.70 560	32	0.29 440	9.95 020	7	5
56	9.65 605	25	9.70 592	31	0.29 408	9.95 014	6	4
57	9.65 630	25	9.70 623	31	0.29 377	9.95 007	7	3
58	9.65 655	25	9.70 654	31	0.29 346	9.95 001	6	2
59	9.65 680	25	9.70 685	32	0.29 315	9.94 995	6	1
60	9.65 705		9.70 717		0.29 283	9.94 988	7	0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	′

P P

	32	31
1	0.5	0.5
2	1.1	1.0
3	1.6	1.6
4	2.1	2.1
5	2.7	2.6
6	3.2	3.1
7	3.7	3.6
8	4.3	4.1
9	4.8	4.6
10	5.3	5.2
20	10.7	10.3
30	16.0	15.5
40	21.3	20.7
50	26.7	25.8

	26	25	24
1	0.4	0.4	0.4
2	0.9	0.8	0.8
3	1.3	1.2	1.2
4	1.7	1.7	1.6
5	2.2	2.1	2.0
6	2.6	2.5	2.4
7	3.0	2.9	2.8
8	3.5	3.3	3.2
9	3.9	3.8	3.6
10	4.3	4.2	4.0
20	8.7	8.3	8.0
30	13.0	12.5	12.0
40	17.3	16.7	16.0
50	21.7	20.8	20.0

	7	6
1	0.1	0.1
2	0.2	0.2
3	0.4	0.3
4	0.5	0.4
5	0.6	0.5
6	0.7	0.6
7	0.8	0.7
8	0.9	0.8
9	1.0	0.9
10	1.2	1.0
20	2.3	2.0
30	3.5	3.0
40	4.7	4.0
50	5.8	5.0

	$\frac{7}{32}$	$\frac{7}{31}$	$\frac{6}{32}$
0			
1	2.3	2.2	2.7
2	6.9	6.6	8.0
3	11.4	11.1	13.3
4	16.0	15.5	18.7
5	20.6	19.9	24.0
6	25.1	24.4	29.3
7	29.7	28.8	—

P P

′	L Sin	d	L Tan	c d	L Cot	L Cos	d	′
0	9.65 705	24	9.70 717	31	0.29 283	9.94 988	6	60
1	9.65 729	25	9.70 748	31	0.29 252	9.94 982	7	59
2	9.65 754	25	9.70 779	31	0.29 221	9.94 975	6	58
3	9.65 779	25	9.70 810	31	0.29 190	9.94 969	7	57
4	9.65 804	24	9.70 841	32	0.29 159	9.94 962	6	56
5	9.65 828	25	9.70 873	31	0.29 127	9.94 956	7	55
6	9.65 853	25	9.70 904	31	0.29 096	9.94 949	6	54
7	9.65 878	24	9.70 935	31	0.29 065	9.94 943	7	53
8	9.65 902	25	9.70 966	31	0.29 034	9.94 936	6	52
9	9.65 927	25	9.70 997	31	0.29 003	9.94 930	7	51
10	9.65 952	24	9.71 028	31	0.28 972	9.94 923	6	50
11	9.65 976	25	9.71 059	31	0.28 941	9.94 917	6	49
12	9.66 001	24	9.71 090	31	0.28 910	9.94 911	7	48
13	9.66 025	25	9.71 121	32	0.28 879	9.94 904	6	47
14	9.66 050	25	9.71 153	31	0.28 847	9.94 898	7	46
15	9.66 075	24	9.71 184	31	0.28 816	9.94 891	6	45
16	9.66 099	25	9.71 215	31	0.28 785	9.94 885	7	44
17	9.66 124	24	9.71 246	31	0.28 754	9.94 878	7	43
18	9.66 148	25	9.71 277	31	0.28 723	9.94 871	6	42
19	9.66 173	24	9.71 308	31	0.28 692	9.94 865	7	41
20	9.66 197	24	9.71 339	31	0.28 661	9.94 858	6	40
21	9.66 221	25	9.71 370	31	0.28 630	9.94 852	7	39
22	9.66 246	24	9.71 401	30	0.28 599	9.94 845	6	38
23	9.66 270	25	9.71 431	31	0.28 569	9.94 839	7	37
24	9.66 295	24	9.71 462	31	0.28 538	9.94 832	6	36
25	9.66 319	24	9.71 493	31	0.28 507	9.94 826	7	35
26	9.66 343	25	9.71 524	31	0.28 476	9.94 819	6	34
27	9.66 368	24	9.71 555	31	0.28 445	9.94 813	7	33
28	9.66 392	24	9.71 586	31	0.28 414	9.94 806	7	32
29	9.66 416	25	9.71 617	31	0.28 383	9.94 799	6	31
30	9.66 441	24	9.71 648	31	0.28 352	9.94 793	7	30
31	9.66 465	24	9.71 679	30	0.28 321	9.94 786	6	29
32	9.66 489	24	9.71 709	31	0.28 291	9.94 780	7	28
33	9.66 513	24	9.71 740	31	0.28 260	9.94 773	6	27
34	9.66 537	25	9.71 771	31	0.28 229	9.94 767	7	26
35	9.66 562	24	9.71 802	31	0.28 198	9.94 760	7	25
36	9.66 586	24	9.71 833	30	0.28 167	9.94 753	6	24
37	9.66 610	24	9.71 863	31	0.28 137	9.94 747	7	23
38	9.66 634	24	9.71 894	31	0.28 106	9.94 740	7	22
39	9.66 658	24	9.71 925	30	0.28 075	9.94 734	6	21
40	9.66 682	24	9.71 955	31	0.28 045	9.94 727	7	20
41	9.66 706	25	9.71 986	31	0.28 014	9.94 720	7	19
42	9.66 731	24	9.72 017	31	0.27 983	9.94 714	7	18
43	9.66 755	24	9.72 048	30	0.27 952	9.94 707	7	17
44	9.66 779	24	9.72 078	31	0.27 922	9.94 700	6	16
45	9.66 803	24	9.72 109	31	0.27 891	9.94 694	7	15
46	9.66 827	24	9.72 140	30	0.27 860	9.94 687	7	14
47	9.66 851	24	9.72 170	31	0.27 830	9.94 680	6	13
48	9.66 875	24	9.72 201	30	0.27 799	9.94 674	7	12
49	9.66 899	23	9.72 231	31	0.27 769	9.94 667	7	11
50	9.66 922	24	9.72 262	31	0.27 738	9.94 660	6	10
51	9.66 946	24	9.72 293	30	0.27 707	9.94 654	7	9
52	9.66 970	24	9.72 323	31	0.27 677	9.94 647	7	8
53	9.66 994	24	9.72 354	30	0.27 646	9.94 640	6	7
54	9.67 018	24	9.72 384	31	0.27 616	9.94 634	7	6
55	9.67 042	24	9.72 415	30	0.27 585	9.94 627	7	5
56	9.67 066	24	9.72 445	31	0.27 555	9.94 620	6	4
57	9.67 090	24	9.72 476	30	0.27 524	9.94 614	7	3
58	9.67 113	23	9.72 506	31	0.27 494	9.94 607	7	2
59	9.67 137	24	9.72 537	30	0.27 463	9.94 600	7	1
60	9.67 161	24	9.72 567	30	0.27 433	9.94 593	7	0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	′

P	P		
	32	31	30
1	0.5	0.5	0.5
2	1.1	1.0	1.0
3	1.6	1.6	1.5
4	2.1	2.1	2.0
5	2.7	2.6	2.5
6	3.2	3.1	3.0
7	3.7	3.6	3.5
8	4.3	4.1	4.0
9	4.8	4.6	4.5
10	5.3	5.2	5.0
20	10.7	10.3	10.0
30	16.0	15.5	15.0
40	21.3	20.7	20.0
50	26.7	25.8	25.0

	25	24	23
1	0.4	0.4	0.4
2	0.8	0.8	0.8
3	1.2	1.2	1.2
4	1.7	1.6	1.5
5	2.1	2.0	1.9
6	2.5	2.4	2.3
7	2.9	2.8	2.7
8	3.3	3.2	3.1
9	3.8	3.6	3.4
10	4.2	4.0	3.8
20	8.3	8.0	7.7
30	12.5	12.0	11.5
40	16.7	16.0	15.3
50	20.8	20.0	19.2

	7	6
1	0.1	0.1
2	0.2	0.2
3	0.4	0.3
4	0.5	0.4
5	0.6	0.5
6	0.7	0.6
7	0.8	0.7
8	0.9	0.8
9	1.0	0.9
10	1.2	1.0
20	2.3	2.0
30	3.5	3.0
40	4.7	4.0
50	5.8	5.0

	7/30	6/31	6/30
0	2.1	2.6	2.5
1	6.4	7.8	7.5
2	10.7	12.9	12.5
3	15.0	18.1	17.5
4	19.3	23.2	22.5
5	23.6	28.4	27.5
6	27.9	—	—
7			

P	P

′	L Sin	d	L Tan	c d	L Cot	L Cos	d	′
0	9.67 161		9.72 567		0.27 433	9.94 593		60
		24		31			6	
1	9.67 185		9.72 598		0.27 402	9.94 587	7	59
2	9.67 208	23	9.72 628	30	0.27 372	9.94 580	7	58
3	9.67 232	24	9.72 659	31	0.27 341	9.94 573	6	57
4	9.67 256	24	9.72 689	30	0.27 311	9.94 567	7	56
5	9.67 280	24	9.72 720	31	0.27 280	9.94 560	7	55
6	9.67 303	23	9.72 750	30	0.27 250	9.94 553	7	54
		24		30			7	
7	9.67 327		9.72 780		0.27 220	9.94 546	6	53
8	9.67 350	23	9.72 811	31	0.27 189	9.94 540	7	52
9	9.67 374	24	9.72 841	30	0.27 159	9.94 533	7	51
10	9.67 398	24	9.72 872	31	0.27 128	9.94 526	7	50
		23		30			7	
11	9.67 421		9.72 902		0.27 098	9.94 519	6	49
12	9.67 445	24	9.72 932	30	0.27 068	9.94 513	7	48
13	9.67 468	23	9.72 963	31	0.27 037	9.94 506	7	47
		24		30			7	
14	9.67 492		9.72 993		0.27 007	9.94 499	7	46
15	9.67 515	23	9.73 023	30	0.26 977	9.94 492	7	45
16	9.67 539	24	9.73 054	31	0.26 946	9.94 485	6	44
		23		30			7	
17	9.67 562		9.73 084		0.26 916	9.94 479	7	43
18	9.67 586	24	9.73 114	30	0.26 886	9.94 472	7	42
19	9.67 609	23	9.73 144	30	0.26 856	9.94 465	7	41
20	9.67 633	24	9.73 175	31	0.26 825	9.94 458	7	40
		23		30			7	
21	9.67 656		9.73 205		0.26 795	9.94 451	6	39
22	9.67 680	24	9.73 235	30	0.26 765	9.94 445	7	38
23	9.67 703	23	9.73 265	30	0.26 735	9.94 438	7	37
		23		30			7	
24	9.67 726		9.73 295		0.26 705	9.94 431	7	36
25	9.67 750	24	9.73 326	31	0.26 674	9.94 424	7	35
26	9.67 773	23	9.73 356	30	0.26 644	9.94 417	7	34
		23		30			7	
27	9.67 796		9.73 386		0.26 614	9.94 410	6	33
28	9.67 820	24	9.73 416	30	0.26 584	9.94 404	7	32
29	9.67 843	23	9.73 446	30	0.26 554	9.94 397	7	31
30	9.67 866	23	9.73 476	30	0.26 524	9.94 390	7	30
		24		31			7	
31	9.67 890		9.73 507		0.26 493	9.94 383	7	29
32	9.67 913	23	9.73 537	30	0.26 463	9.94 376	7	28
33	9.67 936	23	9.73 567	30	0.26 433	9.94 369	7	27
		23		30			7	
34	9.67 959		9.73 597		0.26 403	9.94 362	7	26
35	9.67 982	23	9.73 627	30	0.26 373	9.94 355	6	25
36	9.68 006	24	9.73 657	30	0.26 343	9.94 349	7	24
		23		30			7	
37	9.68 029		9.73 687		0.26 313	9.94 342	7	23
38	9.68 052	23	9.73 717	30	0.26 283	9.94 335	7	22
39	9.68 075	23	9.73 747	30	0.26 253	9.94 328	7	21
40	9.68 098	23	9.73 777	30	0.26 223	9.94 321	7	20
		23		30			7	
41	9.68 121		9.73 807		0.26 193	9.94 314	7	19
42	9.68 144	23	9.73 837	30	0.26 163	9.94 307	7	18
43	9.68 167	23	9.73 867	30	0.26 133	9.94 300	7	17
		23		30			7	
44	9.68 190		9.73 897		0.26 103	9.94 293	7	16
45	9.68 213	23	9.73 927	30	0.26 073	9.94 286	7	15
46	9.68 237	24	9.73 957	30	0.26 043	9.94 279	6	14
		23		30			7	
47	9.68 260		9.73 987		0.26 013	9.94 273	7	13
48	9.68 283	23	9.74 017	30	0.25 983	9.94 266	7	12
49	9.68 305	22	9.74 047	30	0.25 953	9.94 259	7	11
50	9.68 328	23	9.74 077	30	0.25 923	9.94 252	7	10
		23		30			7	
51	9.68 351		9.74 107		0.25 893	9.94 245	7	9
52	9.68 374	23	9.74 137	30	0.25 863	9.94 238	7	8
53	9.68 397	23	9.74 166	29	0.25 834	9.94 231	7	7
		23		30			7	
54	9.68 420		9.74 196		0.25 804	9.94 224	7	6
55	9.68 443	23	9.74 226	30	0.25 774	9.94 217	7	5
56	9.68 466	23	9.74 256	30	0.25 744	9.94 210	7	4
		23		30			7	
57	9.68 489		9.74 286		0.25 714	9.94 203	7	3
58	9.68 512	23	9.74 316	30	0.25 684	9.94 196	7	2
59	9.68 534	22	9.74 345	29	0.25 655	9.94 189	7	1
60	9.68 557	23	9.74 375	30	0.25 625	9.94 182	7	0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	′

P	P		
	31	30	29
1	0.5	0.5	0.5
2	1.0	1.0	1.0
3	1.6	1.5	1.4
4	2.1	2.0	1.9
5	2.6	2.5	2.4
6	3.1	3.0	2.9
7	3.6	3.5	3.4
8	4.1	4.0	3.9
9	4.6	4.5	4.4
10	5.2	5.0	4.8
20	10.3	10.0	9.7
30	15.5	15.0	14.5
40	20.7	20.0	19.3
50	25.8	25.0	24.2

	24	23	22
1	0.4	0.4	0.4
2	0.8	0.8	0.7
3	1.2	1.2	1.1
4	1.6	1.5	1.5
5	2.0	1.9	1.8
6	2.4	2.3	2.2
7	2.8	2.7	2.6
8	3.2	3.1	2.9
9	3.6	3.4	3.3
10	4.0	3.8	3.7
20	8.0	7.7	7.3
30	12.0	11.5	11.0
40	16.0	15.3	14.7
50	20.0	19.2	18.3

	7	6
1	0.1	0.1
2	0.2	0.2
3	0.4	0.3
4	0.5	0.4
5	0.6	0.5
6	0.7	0.6
7	0.8	0.7
8	0.9	0.8
9	1.0	0.9
10	1.2	1.0
20	2.3	2.0
30	3.5	3.0
40	4.7	4.0
50	5.8	5.0

	7/31	6/31	6/30
0			
1	2.2	2.6	2.5
2	6.6	7.8	7.5
3	11.1	12.9	12.5
4	15.5	18.1	17.5
5	19.9	23.2	22.5
6	24.4	28.4	27.5
7	28.8		

P	P

′	L Sin	d	L Tan	c d	L Cot	L Cos	d	′
0	9.68 557		9.74 375		0.25 625	9.94 182		60
		23		30			7	
1	9.68 580		9.74 405		0.25 595	9.94 175	7	59
		23		30			7	
2	9.68 603		9.74 435		0.25 565	9.94 168	7	58
		22		30			7	
3	9.68 625		9.74 465		0.25 535	9.94 161	7	57
		23		29			7	
4	9.68 648		9.74 494		0.25 506	9.94 154	7	56
		23		30			7	
5	9.68 671		9.74 524		0.25 476	9.94 147	7	55
		23		30			7	
6	9.68 694		9.74 554		0.25 446	9.94 140	7	54
		22		29			7	
7	9.68 716		9.74 583		0.25 417	9.94 133	7	53
		23		30			7	
8	9.68 739		9.74 613		0.25 387	9.94 126	7	52
		23		30			7	
9	9.68 762		9.74 643		0.25 357	9.94 119	7	51
		22		30			7	
10	9.68 784		9.74 673		0.25 327	9.94 112	7	50
		23		29			7	
11	9.68 807		9.74 702		0.25 298	9.94 105	7	49
		22		30			7	
12	9.68 829		9.74 732		0.25 268	9.94 098	7	48
		23		30			8	
13	9.68 852		9.74 762		0.25 238	9.94 090	7	47
		23		29			7	
14	9.68 875		9.74 791		0.25 209	9.94 083	7	46
		22		30			7	
15	9.68 897		9.74 821		0.25 179	9.94 076	7	45
		23		30			7	
16	9.68 920		9.74 851		0.25 149	9.94 069	7	44
		22		29			7	
17	9.68 942		9.74 880		0.25 120	9.94 062	7	43
		23		30			7	
18	9.68 965		9.74 910		0.25 090	9.94 055	7	42
		22		29			7	
19	9.68 987		9.74 939		0.25 061	9.94 048	7	41
		23		30			7	
20	9.69 010		9.74 969		0.25 031	9.94 041	7	40
		22		29			7	
21	9.69 032		9.74 998		0.25 002	9.94 034	7	39
		23		30			7	
22	9.69 055		9.75 028		0.24 972	9.94 027	7	38
		22		30			7	
23	9.69 077		9.75 058		0.24 942	9.94 020	8	37
		23		29			7	
24	9.69 100		9.75 087		0.24 913	9.94 012	7	36
		22		30			7	
25	9.69 122		9.75 117		0.24 883	9.94 005	7	35
		22		29			7	
26	9.69 144		9.75 146		0.24 854	9.93 998	7	34
		23		30			7	
27	9.69 167		9.75 176		0.24 824	9.93 991	7	33
		22		29			7	
28	9.69 189		9.75 205		0.24 795	9.93 984	7	32
		23		30			7	
29	9.69 212		9.75 235		0.24 765	9.93 977	7	31
		22		29			7	
30	9.69 234		9.75 264		0.24 736	9.93 970	7	30
		22		30			7	
31	9.69 256		9.75 294		0.24 706	9.93 963	8	29
		23		29			7	
32	9.69 279		9.75 323		0.24 677	9.93 955	7	28
		22		30			7	
33	9.69 301		9.75 353		0.24 647	9.93 948	7	27
		22		29			7	
34	9.69 323		9.75 382		0.24 618	9.93 941	7	26
		22		29			7	
35	9.69 345		9.75 411		0.24 589	9.93 934	7	25
		23		30			7	
36	9.69 368		9.75 441		0.24 559	9.93 927	7	24
		22		29			7	
37	9.69 390		9.75 470		0.24 530	9.93 920	8	23
		22		30			7	
38	9.69 412		9.75 500		0.24 500	9.93 912	7	22
		22		29			7	
39	9.69 434		9.75 529		0.24 471	9.93 905	7	21
		22		29			7	
40	9.69 456		9.75 558		0.24 442	9.93 898	7	20
		23		30			7	
41	9.69 479		9.75 588		0.24 412	9.93 891	7	19
		22		29			7	
42	9.69 501		9.75 617		0.24 383	9.93 884	8	18
		22		30			7	
43	9.69 523		9.75 647		0.24 353	9.93 876	7	17
		22		29			7	
44	9.69 545		9.75 676		0.24 324	9.93 869	7	16
		22		30			7	
45	9.69 567		9.75 705		0.24 295	9.93 862	7	15
		22		30			8	
46	9.69 589		9.75 735		0.24 265	9.93 855	7	14
		22		29			7	
47	9.69 611		9.75 764		0.24 236	9.93 847	7	13
		22		29			7	
48	9.69 633		9.75 793		0.24 207	9.93 840	7	12
		22		29			7	
49	9.69 655		9.75 822		0.24 178	9.93 833	7	11
		22		30			7	
50	9.69 677		9.75 852		0.24 148	9.93 826	7	10
		22		29			8	
51	9.69 699		9.75 881		0.24 119	9.93 819	7	9
		22		29			7	
52	9.69 721		9.75 910		0.24 090	9.93 811	7	8
		22		29			7	
53	9.69 743		9.75 939		0.24 061	9.93 804	7	7
		22		30			8	
54	9.69 765		9.75 969		0.24 031	9.93 797	7	6
		22		29			7	
55	9.69 787		9.75 998		0.24 002	9.93 789	7	5
		22		29			7	
56	9.69 809		9.76 027		0.23 973	9.93 782	7	4
		22		29			7	
57	9.69 831		9.76 056		0.23 944	9.93 775	7	3
		22		30			8	
58	9.69 853		9.76 086		0.23 914	9.93 768	7	2
		22		29			7	
59	9.69 875		9.76 115		0.23 885	9.93 760	7	1
		22		29				
60	9.69 897		9.76 144		0.23 856	9.93 753		0
′	L Cos	d	L Cot	c d	L Tan	L Sin	d	′

*150° 240° *330°

60°

P P			
	30	29	23
1	0.5	0.5	0.4
2	1.0	1.0	0.8
3	1.5	1.4	1.2
4	2.0	1.9	1.5
5	2.5	2.4	1.9
6	3.0	2.9	2.3
7	3.5	3.4	2.7
8	4.0	3.9	3.1
9	4.5	4.4	3.4
10	5.0	4.8	3.8
20	10.0	9.7	7.7
30	15.0	14.5	11.5
40	20.0	19.3	15.3
50	25.0	24.2	19.2

	22	8	7
1	0.4	0.1	0.1
2	0.7	0.3	0.2
3	1.1	0.4	0.4
4	1.5	0.5	0.5
5	1.8	0.7	0.6
6	2.2	0.8	0.7
7	2.6	0.9	0.8
8	2.9	1.1	0.9
9	3.3	1.2	1.0
10	3.7	1.3	1.2
20	7.3	2.7	2.3
30	11.0	4.0	3.5
40	14.7	5.3	4.7
50	18.3	6.7	5.8

	8/30	8/29
0		
1	1.9	1.8
2	5.6	5.4
3	9.4	9.1
4	13.1	12.7
5	16.9	16.3
6	20.6	19.9
7	24.4	23.6
8	28.1	27.2

	7/30	7/29
0		
1	2.1	2.1
2	6.4	6.2
3	10.7	10.4
4	15.0	14.5
5	19.3	18.6
6	23.6	22.8
7	27.9	26.9

P P

′	L Sin	d	L Tan	c d	L Cot	L Cos	d	′
0	9.69 897		9.76 144		0.23 856	9.93 753		60
		22		29			7	
1	9.69 919		9.76 173		0.23 827	9.93 746		59
		22		29			8	
2	9.69 941		9.76 202		0.23 798	9.93 738	7	58
		22		29				
3	9.69 963		9.76 231		0.23 769	9 93 731	7	57
		21		30				
4	9.69 984		9.76 261		0.23 739	9.93 724	7	56
		22		29			7	
5	9.70 006		9.76 290		0.23 710	9.93 717		55
		22		29			8	
6	9.70 028		9.76 319		0.23 681	9.93 709	7	54
		22		29				
7	9.70 050		9.76 348		0.23 652	9.93 702	7	53
		22		29				
8	9.70 072		9.76 377		0.23 623	9.93 695	7	52
		21		29			8	
9	9.70 093		9.76 406		0.23 594	9.93 687		51
		22		29			7	
10	9.70 115		9.76 435		0.23 565	9.93 680		50
		22		29			7	
11	9.70 137		9.76 464		0.23 536	9.93 673		49
		22		29			8	
12	9.70 159		9.76 493		0.23 507	9.93 665	7	48
		21		29				
13	9.70 180		9.76 522		0.23 478	9.93 658	7	47
		22		29			8	
14	9.70 202		9.76 551		0.23 449	9.93 650	7	46
		22		29				
15	9.70 224		9.76 580		0.23 420	9.93 643	7	45
		21		29				
16	9.70 245		9.76 609		0.23 391	9.93 636	7	44
		22		30			8	
17	9.70 267		9.76 639		0.23 361	9.93 628		43
		21		29			7	
18	9.70 288		9.76 668		0.23 332	9.93 621	7	42
		22		29			8	
19	9.70 310		9.76 697		0.23 303	9.93 614		41
		22		28			7	
20	9.70 332		9.76 725		0.23 275	9.93 606		40
		21		29			7	
21	9.70 353		9.76 754		0.23 246	9.93 599		39
		22		29			8	
22	9.70 375		9.76 783		0.23 217	9.93 591	7	38
		21		29				
23	9.70 396		9.76 812		0.23 188	9.93 584	7	37
		22		29			8	
24	9.70 418		9.76 841		0.23 159	9.93 577	7	36
		21		29				
25	9.70 439		9.76 870		0.23 130	9.93 569	7	35
		22		29			8	
26	9.70 461		9.76 899		0.23 101	9.93 562	7	34
		21		29			8	
27	9.70 482		9.76 928		0.23 072	9.93 554	7	33
		22		29			8	
28	9.70 504		9.76 957		0.23 043	9.93 547	7	32
		21		29			8	
29	9.70 525		9.76 986		0.23 014	9.93 539	7	31
		22		29			7	
30	9.70 547		9.77 015		0.22 985	9.93 532	7	30
		21		29			7	
31	9.70 568		9.77 044		0.22 956	9.93 525	8	29
		22		29			8	
32	9.70 590		9.77 073		0.22 927	9.93 517	7	28
		21		28			8	
33	9.70 611		9.77 101		0.22 899	9.93 510	7	27
		22		29			8	
34	9.70 633		9.77 130		0.22 870	9.93 502	7	26
		21		29				
35	9.70 654		9.77 159		0.22 841	9.93 495	7	25
		21		29			8	
36	9.70 675		9.77 188		0.22 812	9.93 487	7	24
		22		29			8	
37	9.70 697		9.77 217		0.22 783	9.93 480	7	23
		21		29			8	
38	9.70 718		9.77 246		0.22 754	9.93 472	7	22
		21		28			8	
39	9.70 739		9.77 274		0.22 726	9.93 465	7	21
		22		29			8	
40	9.70 761		9.77 303		0.22 697	9.93 457	7	20
		21		29			8	
41	9.70 782		9.77 332		0.22 668	9.93 450	7	19
		21		29			8	
42	9.70 803		9.77 361		0.22 639	9.93 442	7	18
		21		29			8	
43	9.70 824		9.77 390		0.22 610	9.93 435	7	17
		22		28			8	
44	9.70 846		9.77 418		0.22 582	9.93 427	7	16
		21		29				
45	9.70 867		9.77 447		0.22 553	9.93 420	7	15
		21		29			8	
46	9.70 888		9.77 476		0.22 524	9.93 412	7	14
		21		29			8	
47	9.70 909		9.77 505		0.22 495	9.93 405	7	13
		22		28			8	
48	9.70 931		9.77 533		0.22 467	9.93 397	7	12
		21		29			8	
49	9.70 952		9.77 562		0.22 438	9.93 390	7	11
		21		29			8	
50	9.70 973		9.77 591		0.22 409	9.93 382		10
		21		28			7	
51	9.70 994		9.77 619		0.22 381	9.93 375	7	9
		21		29			8	
52	9.71 015		9.77 648		0.22 352	9.93 367	7	8
		21		29			8	
53	9.71 036		9.77 677		0.22 323	9.93 360	7	7
		22		29			8	
54	9.71 058		9.77 706		0.22 294	9.93 352	8	6
		21		28				
55	9.71 079		9.77 734		0.22 266	9.93 344	7	5
		21		29			8	
56	9.71 100		9.77 763		0.22 237	9.93 337	7	4
		21		28			8	
57	9.71 121		9.77 791		0.22 209	9.93 329		3
		21		29			7	
58	9.71 142		9.77 820		0.22 180	9.93 322	7	2
		21		29			8	
59	9.71 163		9.77 849		0.22 151	9.93 314		1
		21		28			7	
60	9.71 184		9.77 877		0.22 123	9.93 307	7	0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	′

*149° 239° *329°

59°

P P		
	30	29	28
1	0.5	0.5	0.5
2	1.0	1.0	0.9
3	1.5	1.4	1.4
4	2.0	1.9	1.9
5	2.5	2.4	2.3
6	3.0	2.9	2.8
7	3.5	3.4	3.3
8	4.0	3.9	3.7
9	4.5	4.4	4.2
10	5.0	4.8	4.7
20	10.0	9.7	9.3
30	15.0	14.5	14.0
40	20.0	19.3	18.7
50	25.0	24.2	23.3

	22	21
1	0.4	0.4
2	0.7	0.7
3	1.1	1.0
4	1.5	1.4
5	1.8	1.8
6	2.2	2.1
7	2.6	2.4
8	2.9	2.8
9	3.3	3.2
10	3.7	3.5
20	7.3	7.0
30	11.0	10.5
40	14.7	14.0
50	18.3	17.5

	8	7
1	0.1	0.1
2	0.3	0.2
3	0.4	0.4
4	0.5	0.5
5	0.7	0.6
6	0.8	0.7
7	0.9	0.8
8	1.1	0.9
9	1.2	1.0
10	1.3	1.2
20	2.7	2.3
30	4.0	3.5
40	5.3	4.7
50	6.7	5.8

	$\frac{7}{30}$	$\frac{7}{29}$	$\frac{7}{28}$
0			
1	2.1	2.1	2.0
2	6.4	6.2	6.0
3	10.7	10.4	10.0
4	15.0	14.5	14.0
5	19.3	18.6	18.0
6	23.6	22.8	22.0
7	27.9	26.9	26.0

′	L Sin	d	L Tan	c d	L Cot	L Cos	d	
0	9.71 184		9.77 877		0.22 123	9.93 307		60
		21		29			8	
1	9.71 205		9.77 906		0.22 094	9.93 299		59
		21		29			8	
2	9.71 226		9.77 935		0.22 065	9.93 291		58
		21		28			7	
3	9.71 247		9.77 963		0.22 037	9.93 284		57
		21		29			8	
4	9.71 268		9.77 992		0.22 008	9.93 276		56
		21		28			7	
5	9.71 289		9.78 020		0.21 980	9.93 269		55
		21		29			8	
6	9.71 310		9.78 049		0.21 951	9.93 261		54
		21		28			8	
7	9.71 331		9.78 077		0.21 923	9.93 253		53
		21		29			7	
8	9.71 352		9.78 106		0.21 894	9.93 246		52
		21		29			8	
9	9.71 373		9.78 135		0.21 865	9.93 238		51
		20		28			8	
10	9.71 393		9.78 163		0.21 837	9.93 230		50
		21		29			7	
11	9.71 414		9.78 192		0.21 808	9.93 223		49
		21		28			8	
12	9.71 435		9.78 220		0.21 780	9.93 215		48
		21		29			8	
13	9.71 456		9.78 249		0.21 751	9.93 207		47
		21		28			7	
14	9.71 477		9.78 277		0.21 723	9.93 200		46
		21		29			8	
15	9.71 498		9.78 306		0.21 694	9.93 192		45
		21		28			8	
16	9.71 519		9.78 334		0.21 666	9.93 184		44
		20		29			7	
17	9.71 539		9.78 363		0.21 637	9.93 177		43
		21		28			8	
18	9.71 560		9.78 391		0.21 609	9.93 169		42
		21		28			8	
19	9.71 581		9.78 419		0.21 581	9.93 161		41
		21		29			7	
20	9.71 602		9.78 448		0.21 552	9.93 154		40
		20		28			8	
21	9.71 622		9.78 476		0.21 524	9.93 146		39
		21		29			8	
22	9.71 643		9.78 505		0.21 495	9.93 138		38
		21		28			7	
23	9.71 664		9.78 533		0.21 467	9.93 131		37
		21		28			8	
24	9.71 685		9.78 562		0.21 438	9.93 123		36
		20		28			8	
25	9.71 705		9.78 590		0.21 410	9.93 115		35
		21		28			7	
26	9.71 726		9.78 618		0.21 382	9.93 108		34
		21		29			8	
27	9.71 747		9.78 647		0.21 353	9.93 100		33
		20		28			8	
28	9.71 767		9.78 675		0.21 325	9.93 092		32
		21		29			8	
29	9.71 788		9.78 704		0.21 296	9.93 084		31
		21		28			7	
30	9.71 809		9.78 732		0.21 268	9.93 077		30
		20		28			8	
31	9.71 829		9.78 760		0.21 240	9.93 069		29
		21		29			8	
32	9.71 850		9.78 789		0.21 211	9.93 061		28
		20		28			8	
33	9.71 870		9.78 817		0.21 183	9.93 053		27
		21		28			7	
34	9.71 891		9.78 845		0.21 155	9.93 046		26
		20		29			8	
35	9.71 911		9.78 874		0.21 126	9.93 038		25
		21		28			8	
36	9.71 932		9.78 902		0.21 098	9.93 030		24
		20		28			8	
37	9.71 952		9.78 930		0.21 070	9.93 022		23
		21		29			8	
38	9.71 973		9.78 959		0.21 041	9.93 014		22
		21		28			7	
39	9.71 994		9.78 987		0.21 013	9.93 007		21
		20		28			8	
40	9.72 014		9.79 015		0.20 985	9.92 999		20
		20		28			8	
41	9.72 034		9.79 043		0.20 957	9.92 991		19
		21		29			8	
42	9.72 055		9.79 072		0.20 928	9.92 983		18
		20		28			7	
43	9.72 075		9.79 100		0.20 900	9.92 976		17
		21		28			8	
44	9.72 096		9.79 128		0.20 872	9.92 968		16
		20		28			8	
45	9.72 116		9.79 156		0.20 844	9.92 960		15
		21		29			8	
46	9.72 137		9.79 185		0.20 815	9.92 952		14
		20		28			8	
47	9.72 157		9.79 213		0.20 787	9.92 944		13
		20		28			8	
48	9.72 177		9.79 241		0.20 759	9.92 936		12
		21		28			7	
49	9.72 198		9.79 269		0.20 731	9.92 929		11
		20		28			8	
50	9.72 218		9.79 297		0.20 703	9.92 921		10
		20		29			8	
51	9.72 238		9.79 326		0.20 674	9.92 913		9
		21		28			8	
52	9.72 259		9.79 354		0.20 646	9.92 905		8
		20		28			8	
53	9.72 279		9.79 382		0.20 618	9.92 897		7
		20		28			8	
54	9.72 299		9.79 410		0.20 590	9.92 889		6
		21		28			8	
55	9.72 320		9.79 438		0.20 562	9.92 881		5
		20		28			7	
56	9.72 340		9.79 466		0.20 534	9.92 874		4
		20		28			8	
57	9.72 360		9.79 495		0.20 505	9.92 866		3
		21		28			8	
58	9.72 381		9.79 523		0.20 477	9.92 858		2
		20		28			8	
59	9.72 401		9.79 551		0.20 449	9.92 850		1
		20						
60	9.72 421		9.79 579		0.20 421	9.92 842		0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	′

P P

	29	28
1	0.5	0.5
2	1.0	0.9
3	1.4	1.4
4	1.9	1.9
5	2.4	2.3
6	2.9	2.8
7	3.4	3.3
8	3.9	3.7
9	4.4	4.2
10	4.8	4.7
20	9.7	9.3
30	14.5	14.0
40	19.3	18.7
50	24.2	23.3

	21	20
1	0.4	0.3
2	0.7	0.7
3	1.0	1.0
4	1.4	1.3
5	1.8	1.7
6	2.1	2.0
7	2.4	2.3
8	2.8	2.7
9	3.2	3.0
10	3.5	3.3
20	7.0	6.7
30	10.5	10.0
40	14.0	13.3
50	17.5	16.7

	8	7
1	0.1	0.1
2	0.3	0.2
3	0.4	0.4
4	0.5	0.5
5	0.7	0.6
6	0.8	0.7
7	0.9	0.8
8	1.1	0.9
9	1.2	1.0
10	1.3	1.2
20	2.7	2.3
30	4.0	3.5
40	5.3	4.7
50	6.7	5.8

P P

c	8/30	8/29	8/28
1	1.9	1.8	1.8
2	5.6	5.4	5.2
3	9.4	9.1	8.8
4	13.1	12.7	12.2
5	16.9	16.3	15.8
6	20.6	19.9	19.2
7	24.4	23.6	22.8
8	28.1	27.2	26.2

′	L Sin	d	L Tan	cd	L Cot	L Cos	d	′
0	9.72 421	20	9.79 579	28	0.20 421	9.92 842	8	60
1	9.72 441	20	9.79 607	28	0.20 393	9.92 834	8	59
2	9.72 461	21	9.79 635	28	0.20 365	9.92 826	8	58
3	9.72 482	20	9.79 663	28	0.20 337	9.92 818	8	57
4	9.72 502	20	9.79 691	28	0.20 309	9.92 810	7	56
5	9.72 522	20	9.79 719	28	0.20 281	9.92 803	8	55
6	9.72 542	20	9.79 747	29	0.20 253	9.92 795	8	54
7	9.72 562	20	9.79 776	28	0.20 224	9.92 787	8	53
8	9.72 582	20	9.79 804	28	0.20 196	9.92 779	8	52
9	9.72 602	20	9.79 832	28	0.20 168	9.92 771	8	51
10	9.72 622	21	9.79 860	28	0.20 140	9.92 763	8	50
11	9.72 643	20	9.79 888	28	0.20 112	9.92 755	8	49
12	9.72 663	20	9.79 916	28	0.20 084	9.92 747	8	48
13	9.72 683	20	9.79 944	28	0.20 056	9.92 739	8	47
14	9.72 703	20	9.79 972	28	0.20 028	9.92 731	8	46
15	9.72 723	20	9.80 000	28	0.20 000	9.92 723	8	45
16	9.72 743	20	9.80 028	28	0.19 972	9.92 715	8	44
17	9.72 763	20	9.80 056	28	0.19 944	9.92 707	8	43
18	9.72 783	20	9.80 084	28	0.19 916	9.92 699	8	42
19	9.72 803	20	9.80 112	28	0.19 888	9.92 691	8	41
20	9.72 823	20	9.80 140	28	0.19 860	9.92 683	8	40
21	9.72 843	20	9.80 168	27	0.19 832	9.92 675	8	39
22	9.72 863	20	9.80 195	28	0.19 805	9.92 667	8	38
23	9.72 883	19	9.80 223	28	0.19 777	9.92 659	8	37
24	9.72 902	20	9.80 251	28	0.19 749	9.92 651	8	36
25	9.72 922	20	9.80 279	28	0.19 721	9.92 643	8	35
26	9.72 942	20	9.80 307	28	0.19 693	9.92 635	8	34
27	9.72 962	20	9.80 335	28	0.19 665	9.92 627	8	33
28	9.72 982	20	9.80 363	28	0.19 637	9.92 619	8	32
29	9.73 002	20	9.80 391	28	0.19 609	9.92 611	8	31
30	9.73 022	19	9.80 419	28	0.19 581	9.92 603	8	30
31	9.73 041	20	9.80 447	27	0.19 553	9.92 595	8	29
32	9.73 061	20	9.80 474	28	0.19 526	9.92 587	8	28
33	9.73 081	20	9.80 502	28	0.19 498	9.92 579	8	27
34	9.73 101	20	9.80 530	28	0.19 470	9.92 571	8	26
35	9.73 121	19	9.80 558	28	0.19 442	9.92 563	8	25
36	9.73 140	20	9.80 586	28	0.19 414	9.92 555	9	24
37	9.73 160	20	9.80 614	28	0.19 386	9.92 546	8	23
38	9.73 180	20	9.80 642	27	0.19 358	9.92 538	8	22
39	9.73 200	19	9.80 669	28	0.19 331	9.92 530	8	21
40	9.73 219	20	9.80 697	28	0.19 303	9.92 522	8	20
41	9.73 239	20	9.80 725	28	0.19 275	9.92 514	8	19
42	9.73 259	19	9.80 753	28	0.19 247	9.92 506	8	18
43	9.73 278	20	9.80 781	27	0.19 219	9.92 498	8	17
44	9.73 298	20	9.80 808	28	0.19 192	9.92 490	8	16
45	9.73 318	19	9.80 836	28	0.19 164	9.92 482	9	15
46	9.73 337	20	9.80 864	28	0.19 136	9.92 473	8	14
47	9.73 357	20	9.80 892	27	0.19 108	9.92 465	8	13
48	9.73 377	19	9.80 919	28	0.19 081	9.92 457	8	12
49	9.73 396	20	9.80 947	28	0.19 053	9.92 449	8	11
50	9.73 416	19	9.80 975	28	0.19 025	9.92 441	8	10
51	9.73 435	20	9.81 003	27	0.18 997	9.92 433	8	9
52	9.73 455	19	9.81 030	28	0.18 970	9.92 425	8	8
53	9.73 474	20	9.81 058	28	0.18 942	9.92 416	9	7
54	9.73 494	19	9.81 086	27	0.18 914	9.92 408	8	6
55	9.73 513	20	9.81 113	28	0.18 887	9.92 400	8	5
56	9.73 533	19	9.81 141	28	0.18 859	9.92 392	8	4
57	9.73 552	20	9.81 169	27	0.18 831	9.92 384	8	3
58	9.73 572	19	9.81 196	28	0.18 804	9.92 376	9	2
59	9.73 591	20	9.81 224	28	0.18 776	9.92 367	8	1
60	9.73 611		9.81 252		0.18 748	9.92 359		0
	L Cos	d	L Cot	cd	L Tan	L Sin	d	′

P	P		
	29	28	27
1	0.5	0.5	0.4
2	1.0	0.9	0.9
3	1.4	1.4	1.4
4	1.9	1.9	1.8
5	2.4	2.3	2.2
6	2.9	2.8	2.7
7	3.4	3.3	3.2
8	3.9	3.7	3.6
9	4.4	4.2	4.0
10	4.8	4.7	4.5
20	9.7	9.3	9.0
30	14.5	14.0	13.5
40	19.3	18.7	18.0
50	24.2	23.3	22.5

	21	20	19
1	0.4	0.3	0.3
2	0.7	0.7	0.6
3	1.0	1.0	1.0
4	1.4	1.3	1.3
5	1.8	1.7	1.6
6	2.1	2.0	1.9
7	2.4	2.3	2.2
8	2.8	2.7	2.5
9	3.2	3.0	2.8
10	3.5	3.3	3.2
20	7.0	6.7	6.3
30	10.5	10.0	9.5
40	14.0	13.3	12.7
50	17.5	16.7	15.8

	9	8	7
1	0.2	0.1	0.1
2	0.3	0.3	0.2
3	0.4	0.4	0.4
4	0.6	0.5	0.5
5	0.8	0.7	0.6
6	0.9	0.8	0.7
7	1.0	0.9	0.8
8	1.2	1.1	0.9
9	1.4	1.2	1.0
10	1.5	1.3	1.2
20	3.0	2.7	2.3
30	4.5	4.0	3.5
40	6.0	5.3	4.7
50	7.5	6.7	5.8

	8/29	8/28	7/28
0			
1	1.8	1.8	2.0
2	5.4	5.2	6.0
3	9.1	8.8	10.0
4	12.7	12.2	14.0
5	16.3	15.8	18.0
6	19.9	19.2	22.0
7	23.6	22.8	26.0
8	27.2	26.2	—

P	P

33°

*123° 213° *303°

′	L Sin	d	L Tan	c d	L Cot	L Cos	d	′
0	9.73 611		9.81 252		0.18 748	9.92 359		60
		19		27			8	
1	9.73 630		9.81 279		0.18 721	9.92 351		59
		20		28			8	
2	9.73 650		9.81 307		0.18 693	9.92 343		58
		19		28			8	
3	9.73 669		9.81 335		0.18 665	9.92 335		57
		20		27			9	
4	9.73 689		9.81 362		0.18 638	9.92 326		56
		19		28			8	
5	9.73 708		9.81 390		0.18 610	9.92 318		55
		19		28			8	
6	9.73 727		9.81 418		0.18 582	9.92 310		54
		20		27			8	
7	9.73 747		9.81 445		0.18 555	9.92 302		53
		19		28			9	
8	9.73 766		9.81 473		0.18 527	9.92 293		52
		19		27			8	
9	9.73 785		9.81 500		0.18 500	9.92 285		51
		20		28			8	
10	9.73 805		9.81 528		0.18 472	9.92 277		50
		19		28			8	
11	9.73 824		9.81 556		0.18 444	9.92 269		49
		19		27			9	
12	9.73 843		9.81 583		0.18 417	9.92 260		48
		20		28			8	
13	9.73 863		9.81 611		0.18 389	9.92 252		47
		19		27			8	
14	9.73 882		9.81 638		0.18 362	9.92 244		46
		19		28			9	
15	9.73 901		9.81 666		0.18 334	9.92 235		45
		20		27			8	
16	9.73 921		9.81 693		0.18 307	9.92 227		44
		19		28			8	
17	9.73 940		9.81 721		0.18 279	9.92 219		43
		19		27			8	
18	9.73 959		9.81 748		0.18 252	9.92 211		42
		19		28			9	
19	9.73 978		9.81 776		0.18 224	9.92 202		41
		19		27			8	
20	9.73 997		9.81 803		0.18 197	9.92 194		40
		20		28			8	
21	9.74 017		9.81 831		0.18 169	9.92 186		39
		19		27			8	
22	9.74 036		9.81 858		0.18 142	9.92 177		38
		19		28			8	
23	9.74 055		9.81 886		0.18 114	9.92 169		37
		19		27			8	
24	9.74 074		9.81 913		0.18 087	9.92 161		36
		19		28			9	
25	9.74 093		9.81 941		0.18 059	9.92 152		35
		19		27			8	
26	9.74 113		9.81 968		0.18 032	9.92 144		34
		19		28			8	
27	9.74 132		9.81 996		0.18 004	9.92 136		33
		19		27			9	
28	9.74 151		9.82 023		0.17 977	9.92 127		32
		19		28			8	
29	9.74 170		9.82 051		0.17 949	9.92 119		31
		19		27			8	
30	9.74 189		9.82 078		0.17 922	9.92 111		30
		19		28			9	
31	9.74 208		9.82 106		0.17 894	9.92 102		29
		19		27			8	
32	9.74 227		9.82 133		0.17 867	9.92 094		28
		19		28			8	
33	9.74 246		9.82 161		0.17 839	9.92 086		27
		19		27			9	
34	9.74 265		9.82 188		0.17 812	9.92 077		26
		19		27			8	
35	9.74 284		9.82 215		0.17 785	9.92 069		25
		19		28			8	
36	9.74 303		9.82 243		0.17 757	9.92 060		24
		19		27			8	
37	9.74 322		9.82 270		0.17 730	9.92 052		23
		19		28			8	
38	9.74 341		9.82 298		0.17 702	9.92 044		22
		19		27			9	
39	9.74 360		9.82 325		0.17 675	9.92 035		21
		19		27			8	
40	9.74 379		9.82 352		0.17 648	9.92 027		20
		19		28			8	
41	9.74 398		9.82 380		0.17 620	9.92 018		19
		19		27			8	
42	9.74 417		9.82 407		0.17 593	9.92 010		18
		19		28			8	
43	9.74 436		9.82 435		0.17 565	9.92 002		17
		19		27			9	
44	9.74 455		9.82 462		0.17 538	9.91 993		16
		19		27			8	
45	9.74 474		9.82 489		0.17 511	9.91 985		15
		19		28			9	
46	9.74 493		9.82 517		0.17 483	9.91 976		14
		19		27			8	
47	9.74 512		9.82 544		0.17 456	9.91 968		13
		19		27			8	
48	9.74 531		9.82 571		0.17 429	9.91 959		12
		18		28			8	
49	9.74 549		9.82 599		0.17 401	9.91 951		11
		19		27			9	
50	9.74 568		9.82 626		0.17 374	9.91 942		10
		19		27			8	
51	9.74 587		9.82 653		0.17 347	9.91 934		9
		19		28			8	
52	9.74 606		9.82 681		0.17 319	9.91 925		8
		19		27			8	
53	9.74 625		9.82 708		0.17 292	9.91 917		7
		19		27			9	
54	9.74 644		9.82 735		0.17 265	9.91 908		6
		18		27			8	
55	9.74 662		9.82 762		0.17 238	9.91 900		5
		19		28			8	
56	9.74 681		9.82 790		0.17 210	9.91 891		4
		19		27			8	
57	9.74 700		9.82 817		0.17 183	9.91 883		3
		19		27			9	
58	9.74 719		9.82 844		0.17 156	9.91 874		2
		18		27			8	
59	9.74 737		9.82 871		0.17 129	9.91 866		1
		19		28			9	
60	9.74 756		9.82 899		0.17 101	9.91 857		0
′	L Cos	d	L Cot	c d	L Tan	L Sin	d	′

P P

	28	27
1	0.5	0.4
2	0.9	0.9
3	1.4	1.4
4	1.9	1.8
5	2.3	2.2
6	2.8	2.7
7	3.3	3.2
8	3.7	3.6
9	4.2	4.0
10	4.7	4.5
20	9.3	9.0
30	14.0	13.5
40	18.7	18.0
50	23.3	22.5

	20	19	18
1	0.3	0.3	0.3
2	0.7	0.6	0.6
3	1.0	1.0	0.9
4	1.3	1.3	1.2
5	1.7	1.6	1.5
6	2.0	1.9	1.8
7	2.3	2.2	2.1
8	2.7	2.5	2.4
9	3.0	2.8	2.7
10	3.3	3.2	3.0
20	6.7	6.3	6.0
30	10.0	9.5	9.0
40	13.3	12.7	12.0
50	16.7	15.8	15.0

	9	8
1	0.2	0.1
2	0.3	0.3
3	0.4	0.4
4	0.6	0.5
5	0.8	0.7
6	0.9	0.8
7	1.0	0.9
8	1.2	1.1
9	1.4	1.2
10	1.5	1.3
20	3.0	2.7
30	4.5	4.0
40	6.0	5.3
50	7.5	6.7

	9/28	9/27	8/27
0			
1	1.6	1.5	1.7
2	4.7	4.5	5.1
3	7.8	7.5	8.4
4	10.9	10.5	11.8
5	14.0	13.5	15.2
6	17.1	16.5	18.6
7	20.2	19.5	21.9
8	23.3	22.5	25.3
9	26.4	25.5	—

P P

′	L Sin	d	L Tan	c d	L Cot	L Cos	d	′
0	9.74 756		9.82 899		0.17 101	9.91 857		60
		19		27			8	
1	9.74 775		9.82 926		0.17 074	9.91 849		59
		19		27			9	
2	9.74 794		9.82 953		0.17 047	9.91 840		58
		18		27			8	
3	9.74 812		9.82 980		0.17 020	9.91 832		57
		19		28			9	
4	9.74 831		9.83 008		0.16 992	9.91 823	8	56
		19		27			9	
5	9.74 850		9.83 035		0.16 965	9.91 815		55
		18		27			9	
6	9.74 868		9.83 062		0.16 938	9.91 806	8	54
		19		27			9	
7	9.74 887		9.83 089		0.16 911	9.91 798		53
		19		28			9	
8	9.74 906		9.83 117		0.16 883	9.91 789	8	52
		18		27			9	
9	9.74 924		9.83 144		0.16 856	9.91 781		51
		19		27			9	
10	9.74 943		9.83 171		0.16 829	9.91 772		50
		18		27			9	
11	9.74 961		9.83 198		0.16 802	9.91 763		49
		19		27			9	
12	9.74 980		9.83 225		0.16 775	9.91 755		48
		19		27			8	
13	9.74 999		9.83 252		0.16 748	9.91 746		47
		18		28			9	
14	9.75 017		9.83 280		0.16 720	9.91 738	8	46
		19		27			9	
15	9.75 036		9.83 307		0.16 693	9.91 729		45
		18		27			9	
16	9.75 054		9.83 334		0.16 666	9.91 720		44
		19		27			9	
17	9.75 073		9.83 361		0.16 639	9.91 712	8	43
		18		27			9	
18	9.75 091		9.83 388		0.16 612	9.91 703		42
		19		27			8	
19	9.75 110		9.83 415		0.16 585	9.91 695		41
		18		27			9	
20	9.75 128		9.83 442		0.16 558	9.91 686		40
		19		28			9	
21	9.75 147		9.83 470		0.16 530	9.91 677	8	39
		18		27			9	
22	9.75 165		9.83 497		0.16 503	9.91 669		38
		19		27			8	
23	9.75 184		9.83 524		0.16 476	9.91 660		37
		18		27			9	
24	9.75 202		9.83 551		0.16 449	9.91 651	9	36
		19		27			8	
25	9.75 221		9.83 578		0.16 422	9.91 643		35
		18		27			9	
26	9.75 239		9.83 605		0.16 395	9.91 634		34
		19		27			9	
27	9.75 258		9.83 632		0.16 368	9.91 625	8	33
		18		27			9	
28	9.75 276		9.83 659		0.16 341	9.91 617		32
		18		27			9	
29	9.75 294		9.83 686		0.16 314	9.91 608		31
		19		27			9	
30	9.75 313		9.83 713		0.16 287	9.91 599	9	30
		18		27			9	
31	9.75 331		9.83 740		0.16 260	9.91 591		29
		19		28			9	
32	9.75 350		9.83 768		0.16 232	9.91 582		28
		18		27			9	
33	9.75 368		9.83 795		0.16 205	9.91 573		27
		18		27			9	
34	9.75 386		9.83 822		0.16 178	9.91 565	8	26
		19		27			9	
35	9.75 405		9.83 849		0.16 151	9.91 556		25
		18		27			9	
36	9.75 423		9.83 876		0.16 124	9.91 547		24
		18		27			9	
37	9.75 441		9.83 903		0.16 097	9.91 538	9	23
		18		27			8	
38	9.75 459		9.83 930		0.16 070	9.91 530		22
		19		27			9	
39	9.75 478		9.83 957		0.16 043	9.91 521		21
		18		27			9	
40	9.75 496		9.83 984		0.16 016	9.91 512		20
		18		27			9	
41	9.75 514		9.84 011		0.15 989	9.91 504	8	19
		19		27			9	
42	9.75 533		9.84 038		0.15 962	9.91 495		18
		18		27			9	
43	9.75 551		9.84 065		0.15 935	9.91 486		17
		18		27			9	
44	9.75 569		9.84 092		0.15 908	9.91 477	9	16
		18		27			9	
45	9.75 587		9.84 119		0.15 881	9.91 469		15
		18		27			9	
46	9.75 605		9.84 146		0.15 854	9.91 460		14
		19		27			9	
47	9.75 624		9.84 173		0.15 827	9.91 451	9	13
		18		27			9	
48	9.75 642		9.84 200		0.15 800	9.91 442		12
		18		27			9	
49	9.75 660		9.84 227		0.15 773	9.91 433		11
		18		27			9	
50	9.75 678		9.84 254		0.15 746	9.91 425		10
		18		26			9	
51	9.75 696		9.84 280		0.15 720	9.91 416	9	9
		18		27			9	
52	9.75 714		9.84 307		0.15 693	9.91 407		8
		19		27			9	
53	9.75 733		9.84 334		0.15 666	9.91 398		7
		18		27			9	
54	9.75 751		9.84 361		0.15 639	9.91 389	9	6
		18		27			9	
55	9.75 769		9.84 388		0.15 612	9.91 381		5
		18		27			9	
56	9.75 787		9.84 415		0.15 585	9.91 372		4
		18		27			9	
57	9.75 805		9.84 442		0.15 558	9.91 363	9	3
		18		27			9	
58	9.75 823		9.84 469		0.15 531	9.91 354		2
		18		27			9	
59	9.75 841		9.84 496		0.15 504	9.91 345		1
		18		27			9	
60	9.75 859		9.84 523		0.15 477	9.91 336		0
′	L Cos	d	L Cot	c d	L Tan	L Sin	d	′

	P	P
	28	27	26
1	0.5	0.4	0.4
2	0.9	0.9	0.9
3	1.4	1.4	1.3
4	1.9	1.8	1.7
5	2.3	2.2	2.2
6	2.8	2.7	2.6
7	3.3	3.2	3.0
8	3.7	3.6	3.5
9	4.2	4.0	3.9
10	4.7	4.5	4.3
20	9.3	9.0	8.7
30	14.0	13.5	13.0
40	18.7	18.0	17.3
50	23.3	22.5	21.7

	19	18
1	0.3	0.3
2	0.6	0.6
3	1.0	0.9
4	1.3	1.2
5	1.6	1.5
6	1.9	1.8
7	2.2	2.1
8	2.5	2.4
9	2.8	2.7
10	3.2	3.0
20	6.3	6.0
30	9.5	9.0
40	12.7	12.0
50	15.8	15.0

	9	8
1	0.2	0.1
2	0.3	0.3
3	0.4	0.4
4	0.6	0.5
5	0.8	0.7
6	0.9	0.8
7	1.0	0.9
8	1.2	1.1
9	1.4	1.2
10	1.5	1.3
20	3.0	2.7
30	4.5	4.0
40	6.0	5.3
50	7.5	6.7

	$\frac{9}{28}$	$\frac{8}{28}$	$\frac{8}{27}$
0			
1	1.6	1.8	1.7
2	4.7	5.2	5.1
3	7.8	8.8	8.4
4	10.9	12.2	11.8
5	14.0	15.8	15.2
6	17.1	19.2	18.6
7	20.2	22.8	21.9
8	23.3	26.2	25.3
9	26.4	—	—

	P	P

′	L Sin	d	L Tan	cd	L Cot	L Cos	d	′
0	9.75 859	18	9.84 523	27	0.15 477	9.91 336	8	60
1	9.75 877	18	9.84 550	26	0.15 450	9.91 328	9	59
2	9.75 895	18	9.84 576	27	0.15 424	9.91 319	9	58
3	9.75 913	18	9.84 603	27	0.15 397	9.91 310	9	57
4	9.75 931	18	9.84 630	27	0.15 370	9.91 301	9	56
5	9.75 949	18	9.84 657	27	0.15 343	9.91 292	9	55
6	9.75 967	18	9.84 684	27	0.15 316	9.91 283	9	54
7	9.75 985	18	9.84 711	27	0.15 289	9.91 274	8	53
8	9.76 003	18	9.84 738	26	0.15 262	9.91 266	9	52
9	9.76 021	18	9.84 764	27	0.15 236	9.91 257	9	51
10	9.76 039	18	9.84 791	27	0.15 209	9.91 248	9	50
11	9.76 057	18	9.84 818	27	0.15 182	9.91 239	9	49
12	9.76 075	18	9.84 845	27	0.15 155	9.91 230	9	48
13	9.76 093	18	9.84 872	27	0.15 128	9.91 221	9	47
14	9.76 111	18	9.84 899	26	0.15 101	9.91 212	9	46
15	9.76 129	17	9.84 925	27	0.15 075	9.91 203	9	45
16	9.76 146	18	9.84 952	27	0.15 048	9.91 194	9	44
17	9.76 164	18	9.84 979	27	0.15 021	9.91 185	9	43
18	9.76 182	18	9.85 006	27	0.14 994	9.91 176	9	42
19	9.76 200	18	9.85 033	26	0.14 967	9.91 167	9	41
20	9.76 218	18	9.85 059	27	0.14 941	9.91 158	9	40
21	9.76 236	17	9.85 086	27	0.14 914	9.91 149	9	39
22	9.76 253	18	9.85 113	27	0.14 887	9.91 141	8	38
23	9.76 271	18	9.85 140	26	0.14 860	9.91 132	9	37
24	9.76 289	18	9.85 166	27	0.14 834	9.91 123	9	36
25	9.76 307	17	9.85 193	27	0.14 807	9.91 114	9	35
26	9.76 324	18	9.85 220	27	0.14 780	9.91 105	9	34
27	9.76 342	18	9.85 247	26	0.14 753	9.91 096	9	33
28	9.76 360	18	9.85 273	27	0.14 727	9.91 087	9	32
29	9.76 378	17	9.85 300	27	0.14 700	9.91 078	9	31
30	9.76 395	18	9.85 327	27	0.14 673	9.91 069	9	30
31	9.76 413	18	9.85 354	26	0.14 646	9.91 060	9	29
32	9.76 431	17	9.85 380	27	0.14 620	9.91 051	9	28
33	9.76 448	18	9.85 407	27	0.14 593	9.91 042	9	27
34	9.76 466	18	9.85 434	26	0.14 566	9.91 033	10	26
35	9.76 484	17	9.85 460	27	0.14 540	9.91 023	9	25
36	9.76 501	18	9.85 487	27	0.14 513	9.91 014	9	24
37	9.76 519	18	9.85 514	26	0.14 486	9.91 005	9	23
38	9.76 537	17	9.85 540	27	0.14 460	9.90 996	9	22
39	9.76 554	18	9.85 567	27	0.14 433	9.90 987	9	21
40	9.76 572	18	9.85 594	26	0.14 406	9.90 978	9	20
41	9.76 590	17	9.85 620	27	0.14 380	9.90 969	9	19
42	9.76 607	18	9.85 647	27	0.14 353	9.90 960	9	18
43	9.76 625	17	9.85 674	26	0.14 326	9.90 951	9	17
44	9.76 642	18	9.85 700	27	0.14 300	9.90 942	9	16
45	9.76 660	17	9.85 727	27	0.14 273	9.90 933	9	15
46	9.76 677	18	9.85 754	26	0.14 246	9.90 924	9	14
47	9.76 695	17	9.85 780	27	0.14 220	9.90 915	9	13
48	9.76 712	18	9.85 807	27	0.14 193	9.90 906	10	12
49	9.76 730	17	9.85 834	26	0.14 166	9.90 896	9	11
50	9.76 747	18	9.85 860	27	0.14 140	9.90 887	9	10
51	9.76 765	17	9.85 887	26	0.14 113	9.90 878	9	9
52	9.76 782	18	9.85 913	27	0.14 087	9.90 869	9	8
53	9.76 800	17	9.85 940	27	0.14 060	9.90 860	9	7
54	9.76 817	18	9.85 967	26	0.14 033	9.90 851	9	6
55	9.76 835	17	9.85 993	27	0.14 007	9.90 842	9	5
56	9.76 852	18	9.86 020	26	0.13 980	9.90 832	10	4
57	9.76 870	17	9.86 046	27	0.13 954	9.90 823	9	3
58	9.76 887	17	9.86 073	27	0.13 927	9.90 814	9	2
59	9.76 904	18	9.86 100	26	0.13 900	9.90 805	9	1
60	9.76 922		9.86 126		0.13 874	9.90 796	9	0
′	L Cos	d	L Cot	cd	L Tan	L Sin	d	′

*144° 234° *324°

54°

P P

	27	26	18
1	0.4	0.4	0.3
2	0.9	0.9	0.6
3	1.4	1.3	0.9
4	1.8	1.7	1.2
5	2.2	2.2	1.5
6	2.7	2.6	1.8
7	3.2	3.0	2.1
8	3.6	3.5	2.4
9	4.0	3.9	2.7
10	4.5	4.3	3.0
20	9.0	8.7	6.0
30	13.5	13.0	9.0
40	18.0	17.3	12.0
50	22.5	21.7	15.0

	17	10	9	8
1	0.3	0.2	0.2	0.1
2	0.6	0.3	0.3	0.3
3	0.8	0.5	0.4	0.4
4	1.1	0.7	0.6	0.5
5	1.4	0.8	0.8	0.7
6	1.7	1.0	0.9	0.8
7	2.0	1.2	1.0	0.9
8	2.3	1.3	1.2	1.1
9	2.6	1.5	1.4	1.2
10	2.8	1.7	1.5	1.3
20	5.7	3.3	3.0	2.7
30	8.5	5.0	4.5	4.0
40	11.3	6.7	6.0	5.3
50	14.2	8.3	7.5	6.7

	10/27	10/26
0		
1	1.4	1.3
2	4.1	3.9
3	6.8	6.5
4	9.4	9.1
5	12.2	11.7
6	14.8	14.3
7	17.6	16.9
8	20.2	19.5
9	22.9	22.1
10	25.6	24.7

	9/27	9/26
0		
1	1.5	1.4
2	4.5	4.3
3	7.5	7.2
4	10.5	10.1
5	13.5	13.0
6	16.5	15.9
7	19.5	18.8
8	22.5	21.7
9	25.5	24.6

P P

	L Sin	d	L Tan	c d	L Cot	L Cos	d	
0	9.76 922	17	9.86 126	27	0.13 874	9.90 796	9	60
1	9.76 939	18	9.86 153	26	0.13 847	9.90 787	10	59
2	9.76 957	17	9.86 179	27	0.13 821	9.90 777	9	58
3	9.76 974	17	9.86 206	26	0.13 794	9.90 768	9	57
4	9.76 991	18	9.86 232	27	0.13 768	9.90 759	9	56
5	9.77 009	17	9.86 259	26	0.13 741	9.90 750	9	55
6	9.77 026	17	9.86 285	27	0.13 715	9.90 741	10	54
7	9.77 043	18	9.86 312	26	0.13 688	9.90 731	9	53
8	9.77 061	17	9.86 338	27	0.13 662	9.90 722	9	52
9	9.77 078	17	9.86 365	27	0.13 635	9.90 713	9	51
10	9.77 095	17	9.86 392	26	0.13 608	9.90 704	10	50
11	9.77 112	18	9.86 418	27	0.13 582	9.90 694	9	49
12	9.77 130	17	9.86 445	26	0.13 555	9.90 685	9	48
13	9.77 147	17	9.86 471	27	0.13 529	9.90 676	9	47
14	9.77 164	17	9.86 498	26	0.13 502	9.90 667	10	46
15	9.77 181	18	9.86 524	27	0.13 476	9.90 657	9	45
16	9.77 199	17	9.86 551	26	0.13 449	9.90 648	9	44
17	9.77 216	17	9.86 577	26	0.13 423	9.90 639	9	43
18	9.77 233	17	9.86 603	27	0.13 397	9.90 630	10	42
19	9.77 250	18	9.86 630	26	0.13 370	9.90 620	9	41
20	9.77 268	17	9.86 656	27	0.13 344	9.90 611	9	40
21	9.77 285	17	9.86 683	26	0.13 317	9.90 602	10	39
22	9.77 302	17	9.86 709	27	0.13 291	9.90 592	9	38
23	9.77 319	17	9.86 736	26	0.13 264	9.90 583	9	37
24	9.77 336	17	9.86 762	27	0.13 238	9.90 574	9	36
25	9.77 353	17	9.86 789	26	0.13 211	9.90 565	10	35
26	9.77 370	17	9.86 815	27	0.13 185	9.90 555	9	34
27	9.77 387	18	9.86 842	26	0.13 158	9.90 546	9	33
28	9.77 405	17	9.86 868	26	0.13 132	9.90 537	10	32
29	9.77 422	17	9.86 894	27	0.13 106	9.90 527	9	31
30	9.77 439	17	9.86 921	26	0.13 079	9.90 518	9	30
31	9.77 456	17	9.86 947	27	0.13 053	9.90 509	10	29
32	9.77 473	17	9.86 974	26	0.13 026	9.90 499	9	28
33	9.77 490	17	9.87 000	27	0.13 000	9.90 490	10	27
34	9.77 507	17	9.87 027	26	0.12 973	9.90 480	9	26
35	9.77 524	17	9.87 053	26	0.12 947	9.90 471	9	25
36	9.77 541	17	9.87 079	27	0.12 921	9.90 462	10	24
37	9.77 558	17	9.87 106	26	0.12 894	9.90 452	9	23
38	9.77 575	17	9.87 132	26	0.12 868	9.90 443	9	22
39	9.77 592	17	9.87 158	27	0.12 842	9.90 434	10	21
40	9.77 609	17	9.87 185	26	0.12 815	9.90 424	9	20
41	9.77 626	17	9.87 211	27	0.12 789	9.90 415	10	19
42	9.77 643	17	9.87 238	26	0.12 762	9.90 405	9	18
43	9.77 660	17	9.87 264	26	0.12 736	9.90 396	10	17
44	9.77 677	17	9.87 290	27	0.12 710	9.90 386	9	16
45	9.77 694	17	9.87 317	26	0.12 683	9.90 377	9	15
46	9.77 711	17	9.87 343	26	0.12 657	9.90 368	10	14
47	9.77 728	16	9.87 369	27	0.12 631	9.90 358	9	13
48	9.77 744	17	9.87 396	26	0.12 604	9.90 349	10	12
49	9.77 761	17	9.87 422	26	0.12 578	9.90 339	9	11
50	9.77 778	17	9.87 448	27	0.12 552	9.90 330	10	10
51	9.77 795	17	9.87 475	26	0.12 525	9.90 320	9	9
52	9.77 812	17	9.87 501	26	0.12 499	9.90 311	10	8
53	9.77 829	17	9.87 527	27	0.12 473	9.90 301	9	7
54	9.77 846	16	9.87 554	26	0.12 446	9.90 292	10	6
55	9.77 862	17	9.87 580	26	0.12 420	9.90 282	9	5
56	9.77 879	17	9.87 606	27	0.12 394	9.90 273	10	4
57	9.77 896	17	9.87 633	26	0.12 367	9.90 263	9	3
58	9.77 913	17	9.87 659	26	0.12 341	9.90 254	10	2
59	9.77 930	16	9.87 685	26	0.12 315	9.90 244	9	1
60	9.77 946		9.87 711		0.12 289	9.90 235	9	0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	′

P	P	
	27	26
1	0.4	0.4
2	0.9	0.9
3	1.4	1.3
4	1.8	1.7
5	2.2	2.2
6	2.7	2.6
7	3.2	3.0
8	3.6	3.5
9	4.0	3.9
10	4.5	4.3
20	9.0	8.7
30	13.5	13.0
40	18.0	17.3
50	22.5	21.7

	18	17	16
1	0.3	0.3	0.3
2	0.6	0.6	0.5
3	0.9	0.8	0.8
4	1.2	1.1	1.1
5	1.5	1.4	1.3
6	1.8	1.7	1.6
7	2.1	2.0	1.9
8	2.4	2.3	2.1
9	2.7	2.6	2.4
10	3.0	2.8	2.7
20	6.0	5.7	5.3
30	9.0	8.5	8.0
40	12.0	11.3	10.7
50	15.0	14.2	13.3

	10	9
1	0.2	0.2
2	0.3	0.3
3	0.5	0.4
4	0.7	0.6
5	0.8	0.8
6	1.0	0.9
7	1.2	1.0
8	1.3	1.2
9	1.5	1.4
10	1.7	1.5
20	3.3	3.0
30	5.0	4.5
40	6.7	6.0
50	8.3	7.5

	$\frac{9}{27}$	$\frac{9}{26}$
0	1.5	1.4
1	4.5	4.3
2	7.5	7.2
3	10.5	10.1
4	13.5	13.0
5	16.5	15.9
6	19.5	18.8
7	22.5	21.7
8	25.5	24.6
9		

P	P

	L Sin	d	L Tan	cd	L Cot	L Cos	d	
	9.77 946		9.87 711		0.12 289	9.90 235		60
		17		27			10	
	9.77 963	17	9.87 738	26	0.12 262	9.90 225	9	59
	9.77 980	17	9.87 764	26	0.12 236	9.90 216	10	58
	9.77 997	16	9.87 790	27	0.12 210	9.90 206	9	57
	9.78 013	17	9.87 817	26	0.12 183	9.90 197	10	56
	9.78 030	17	9.87 843	26	0.12 157	9.90 187	9	55
	9.78 047	16	9.87 869	26	0.12 131	9.90 178	10	54
	9.78 063	17	9.87 895	27	0.12 105	9.90 168	9	53
	9.78 080	17	9.87 922	26	0.12 078	9.90 159	10	52
	9.78 097	16	9.87 948	26	0.12 052	9.90 149	10	51
	9.78 113	17	9.87 974	26	0.12 026	9.90 139	9	50
	9.78 130	17	9.88 000	27	0.12 000	9.90 130	10	49
	9.78 147	16	9.88 027	26	0.11 973	9.90 120	9	48
	9.78 163	17	9.88 053	26	0.11 947	9.90 111	10	47
	9.78 180	17	9.88 079	26	0.11 921	9.90 101	10	46
	9.78 197	16	9.88 105	26	0.11 895	9.90 091	9	45
	9.78 213	17	9.88 131	27	0.11 869	9.90 082	10	44
	9.78 230	16	9.88 158	26	0.11 842	9.90 072	9	43
	9.78 246	17	9.88 184	26	0.11 816	9.90 063	10	42
	9.78 263	17	9.88 210	26	0.11 790	9.90 053	10	41
	9.78 280	16	9.88 236	26	0.11 764	9.90 043	9	40
	9.78 296	17	9.88 262	27	0.11 738	9.90 034	10	39
	9.78 313	16	9.88 289	26	0.11 711	9.90 024	10	38
	9.78 329	17	9.88 315	26	0.11 685	9.90 014	9	37
	9.78 346	16	9.88 341	26	0.11 659	9.90 005	10	36
	9.78 362	17	9.88 367	26	0.11 633	9.89 995	10	35
	9.78 379	16	9.88 393	27	0.11 607	9.89 985	9	34
	9.78 395	17	9.88 420	26	0.11 580	9.89 976	10	33
	9.78 412	16	9.88 446	26	0.11 554	9.89 966	10	32
	9.78 428	17	9.88 472	26	0.11 528	9.89 956	9	31
	9.78 445	16	9.88 498	26	0.11 502	9.89 947	10	30
	9.78 461	17	9.88 524	26	0.11 476	9.89 937	10	29
	9.78 478	16	9.88 550	27	0.11 450	9.89 927	9	28
	9.78 494	16	9.88 577	26	0.11 423	9.89 918	10	27
	9.78 510	17	9.88 603	26	0.11 397	9.89 908	10	26
	9.78 527	16	9.88 629	26	0.11 371	9.89 898	10	25
	9.78 543	17	9.88 655	26	0.11 345	9.89 888	9	24
	9.78 560	16	9.88 681	26	0.11 319	9.89 879	10	23
	9.78 576	16	9.88 707	26	0.11 293	9.89 869	10	22
	9.78 592	17	9.88 733	26	0.11 267	9.89 859	10	21
	9.78 609	16	9.88 759	27	0.11 241	9.89 849	9	20
	9.78 625	17	9.88 786	26	0.11 214	9.89 840	10	19
	9.78 642	16	9.88 812	26	0.11 188	9.89 830	10	18
	9.78 658	16	9.88 838	26	0.11 162	9.89 820	10	17
	9.78 674	17	9.88 864	26	0.11 136	9.89 810	9	16
	9.78 691	16	9.88 890	26	0.11 110	9.89 801	10	15
	9.78 707	16	9.88 916	26	0.11 084	9.89 791	10	14
	9.78 723	16	9.88 942	26	0.11 058	9.89 781	10	13
	9.78 739	17	9.88 968	26	0.11 032	9.89 771	10	12
	9.78 756	16	9.88 994	26	0.11 006	9.89 761	9	11
	9.78 772	16	9.89 020	26	0.10 980	9.89 752	10	10
	9.78 788	17	9.89 046	27	0.10 954	9.89 742	10	9
	9.78 805	16	9.89 073	26	0.10 927	9.89 732	10	8
	9.78 821	16	9.89 099	26	0.10 901	9.89 722	10	7
	9.78 837	16	9.89 125	26	0.10 875	9.89 712	10	6
	9.78 853	16	9.89 151	26	0.10 849	9.89 702	9	5
	9.78 869	17	9.89 177	26	0.10 823	9.89 693	10	4
	9.78 886	16	9.89 203	26	0.10 797	9.89 683	10	3
	9.78 902	16	9.89 229	26	0.10 771	9.89 673	10	2
	9.78 918	16	9.89 255	26	0.10 745	9.89 663	10	1
60	9.78 934		9.89 281		0.10 719	9.89 653		0
	L Cos	d	L Cot	cd	L Tan	L Sin	d	

	P	P
	27	26
1	0.4	0.4
2	0.9	0.9
3	1.4	1.3
4	1.8	1.7
5	2.2	2.2
6	2.7	2.6
7	3.2	3.0
8	3.6	3.5
9	4.0	3.9
10	4.5	4.3
20	9.0	8.7
30	13.5	13.0
40	18.0	17.3
50	22.5	21.7

	P	P
	17	16
1	0.3	0.3
2	0.6	0.5
3	0.8	0.8
4	1.1	1.1
5	1.4	1.3
6	1.7	1.6
7	2.0	1.9
8	2.3	2.1
9	2.6	2.4
10	2.8	2.7
20	5.7	5.3
30	8.5	8.0
40	11.3	10.7
50	14.2	13.3

	P	P
	10	9
1	0.2	0.2
2	0.3	0.3
3	0.5	0.4
4	0.7	0.6
5	0.8	0.8
6	1.0	0.9
7	1.2	1.0
8	1.3	1.2
9	1.5	1.4
10	1.7	1.5
20	3.3	3.0
30	5.0	4.5
40	6.7	6.0
50	8.3	7.5

	P	P
	10	10
	27	26
0	1.4	1.3
1	4.1	3.9
2	6.8	6.5
3	9.4	9.1
4	12.2	11.7
5	14.8	14.3
6	17.6	16.9
7	20.2	19.5
8	22.9	22.1
9	25.6	24.7
10		

′	L Sin	d	L Tan	c d	L Cot	L Cos	d	
0	9.78 934		9.89 281		0.10 719	9.89 653		60
		16		26			10	
1	9.78 950		9.89 307		0.10 693	9.89 643		59
		17		26			10	
2	9.78 967		9.89 333		0.10 667	9.89 633		58
		16		26			9	
3	9.78 983		9.89 359		0.10 641	9.89 624		57
		16		26			10	
4	9.78 999		9.89 385		0.10 615	9.89 614		56
		16		26			10	
5	9.79 015		9.89 411		0.10 589	9.89 604		55
		16		26			10	
6	9.79 031		9.89 437		0.10 563	9.89 594		54
		16		26			10	
7	9.79 047		9.89 463		0.10 537	9.89 584		53
		16		26			10	
8	9.79 063		9.89 489		0.10 511	9.89 574		52
		16		26			10	
9	9.79 079		9.89 515		0.10 485	9.89 564		51
		16		26			10	
10	9.79 095		9.89 541		0.10 459	9.89 554		50
		16		26			10	
11	9.79 111		9.89 567		0.10 433	9.89 544		49
		17		26			10	
12	9.79 128		9.89 593		0.10 407	9.89 534		48
		16		26			10	
13	9.79 144		9.89 619		0.10 381	9.89 524		47
		16		26			10	
14	9.79 160		9.89 645		0.10 355	9.89 514		46
		16		26			10	
15	9.79 176		9.89 671		0.10 329	9.89 504		45
		16		26			10	
16	9.79 192		9.89 697		0.10 303	9.89 495		44
		16		26			9	
17	9.79 208		9.89 723		0.10 277	9.89 485		43
		16		26			10	
18	9.79 224		9.89 749		0.10 251	9.89 475		42
		16		26			10	
19	9.79 240		9.89 775		0.10 225	9.89 465		41
		16		26			10	
20	9.79 256		9.89 801		0.10 199	9.89 455		40
		16		26			10	
21	9.79 272		9.89 827		0.10 173	9.89 445		39
		16		26			10	
22	9.79 288		9.89 853		0.10 147	9.89 435		38
		16		26			10	
23	9.79 304		9.89 879		0.10 121	9.89 425		37
		15		26			10	
24	9.79 319		9.89 905		0.10 095	9.89 415		36
		16		26			10	
25	9.79 335		9.89 931		0.10 069	9.89 405		35
		16		26			10	
26	9.79 351		9.89 957		0.10 043	9.89 395		34
		16		26			10	
27	9.79 367		9.89 983		0.10 017	9.89 385		33
		16		26			10	
28	9.79 383		9.90 009		0.09 991	9.89 375		32
		16		26			11	
29	9.79 399		9.90 035		0.09 965	9.89 364		31
		16		26			10	
30	9.79 415		9.90 061		0.09 939	9.89 354		30
		16		25			10	
31	9.79 431		9.90 086		0.09 914	9.89 344		29
		16		26			10	
32	9.79 447		9.90 112		0.09 888	9.89 334		28
		16		26			10	
33	9.79 463		9.90 138		0.09 862	9.89 324		27
		15		26			10	
34	9.79 478		9.90 164		0.09 836	9.89 314		26
		16		26			10	
35	9.79 494		9.90 190		0.09 810	9.89 304		25
		16		26			10	
36	9.79 510		9.90 216		0.09 784	9.89 294		24
		16		26			10	
37	9.79 526		9.90 242		0.09 758	9.89 284		23
		16		26			10	
38	9.79 542		9.90 268		0.09 732	9.89 274		22
		16		26			10	
39	9.79 558		9.90 294		0.09 706	9.89 264		21
		15		26			10	
40	9.79 573		9.90 320		0.09 680	9.89 254		20
		16		26			10	
41	9.79 589		9.90 346		0.09 654	9.89 244		19
		16		25			11	
42	9.79 605		9.90 371		0.09 629	9.89 233		18
		16		26			10	
43	9.79 621		9.90 397		0.09 603	9.89 223		17
		15		26			10	
44	9.79 636		9.90 423		0.09 577	9.89 213		16
		16		26			10	
45	9.79 652		9.90 449		0.09 551	9.89 203		15
		16		26			10	
46	9.79 668		9.90 475		0.09 525	9.89 193		14
		16		26			10	
47	9.79 684		9.90 501		0.09 499	9.89 183		13
		15		26			10	
48	9.79 699		9.90 527		0.09 473	9.89 173		12
		16		26			11	
49	9.79 715		9.90 553		0.09 447	9.89 162		11
		16		25			10	
50	9.79 731		9.90 578		0.09 422	9.89 152		10
		15		26			10	
51	9.79 746		9.90 604		0.09 396	9.89 142		9
		16		26			10	
52	9.79 762		9.90 630		0.09 370	9.89 132		8
		16		26			10	
53	9.79 778		9.90 656		0.09 344	9.89 122		7
		15		26			10	
54	9.79 793		9.90 682		0.09 318	9.89 112		6
		16		26			11	
55	9.79 809		9.90 708		0.09 292	9.89 101		5
		16		26			10	
56	9.79 825		9.90 734		0.09 266	9.89 091		4
		15		25			10	
57	9.79 840		9.90 759		0.09 241	9.89 081		3
		16		26			10	
58	9.79 856		9.90 785		0.09 215	9.89 071		2
		16		26			11	
59	9.79 872		9.90 811		0.09 189	9.89 060		1
		15		26			10	
60	9.79 887		9.90 837		0.09 163	9.89 050		0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	′

P P		
	26	25
1	0.4	0.4
2	0.9	0.8
3	1.3	1.2
4	1.7	1.7
5	2.2	2.1
6	2.6	2.5
7	3.0	2.9
8	3.5	3.3
9	3.9	3.8
10	4.3	4.2
20	8.7	8.3
30	13.0	12.5
40	17.3	16.7
50	21.7	20.8

	17	16	15
1	0.3	0.3	0.2
2	0.6	0.5	0.5
3	0.8	0.8	0.8
4	1.1	1.1	1.0
5	1.4	1.3	1.2
6	1.7	1.6	1.5
7	2.0	1.9	1.8
8	2.3	2.1	2.0
9	2.6	2.4	2.2
10	2.8	2.7	2.5
20	5.7	5.3	5.0
30	8.5	8.0	7.5
40	11.3	10.7	10.0
50	14.2	13.3	12.5

	11	10	9
1	0.2	0.2	0.2
2	0.4	0.3	0.3
3	0.6	0.5	0.4
4	0.7	0.7	0.6
5	0.9	0.8	0.8
6	1.1	1.0	0.9
7	1.3	1.2	1.0
8	1.5	1.3	1.2
9	1.6	1.5	1.4
10	1.8	1.7	1.5
20	3.7	3.3	3.0
30	5.5	5.0	4.5
40	7.3	6.7	6.0
50	9.2	8.3	7.5

	10/26	10/25	9/26
0			
1	1.3	1.2	1.4
2	3.9	3.8	4.3
3	6.5	6.2	7.2
4	9.1	8.8	10.1
5	11.7	11.2	13.0
6	14.3	13.8	15.9
7	16.9	16.2	18.8
8	19.5	18.8	21.7
9	22.1	21.2	24.6
10	24.7	23.8	

P P

′	L Sin	d	L Tan	c d	L Cot	L Cos	d	
0	9.79 887		9.90 837		0.09 163	9.89 050		60
		16		26			10	
1	9.79 903		9.90 863		0.09 137	9.89 040		59
		15		26			10	
2	9.79 918		9.90 889		0.09 111	9.89 030		58
		16		25			10	
3	9.79 934		9.90 914		0.09 086	9.89 020		57
		15		26			11	
4	9.79 950		9.90 940		0.09 060	9.89 009		56
		16		26			10	
5	9.79 965		9.90 966		0.09 034	9.88 999		55
		15		26			10	
6	9.79 981		9.90 992		0.09 008	9.88 989		54
		15		26			11	
7	9.79 996		9.91 018		0.08 982	9.88 978		53
		16		25			10	
8	9.80 012		9.91 043		0.08 957	9.88 968		52
		15		26			10	
9	9.80 027		9.91 069		0.08 931	9.88 958		51
		16		26			10	
10	9.80 043		9.91 095		0.08 905	9.88 948		50
		15		26			11	
11	9.80 058		9.91 121		0.08 879	9.88 937		49
		16		26			10	
12	9.80 074		9.91 147		0.08 853	9.88 927		48
		15		25			10	
13	9.80 089		9.91 172		0.08 828	9.88 917		47
		16		26			11	
14	9.80 105		9.91 198		0.08 802	9.88 906		46
		15		26			10	
15	9.80 120		9.91 224		0.08 776	9.88 896		45
		16		26			10	
16	9.80 136		9.91 250		0.08 750	9.88 886		44
		15		26			11	
17	9.80 151		9.91 276		0.08 724	9.88 875		43
		15		25			10	
18	9.80 166		9.91 301		0.08 699	9.88 865		42
		16		26			10	
19	9.80 182		9.91 327		0.08 673	9.88 855		41
		15		26			11	
20	9.80 197		9.91 353		0.08 647	9.88 844		40
		16		26			10	
21	9.80 213		9.91 379		0.08 621	9.88 834		39
		15		25			10	
22	9.80 228		9.91 404		0.08 596	9.88 824		38
		16		26			11	
23	9.80 244		9.91 430		0.08 570	9.88 813		37
		15		26			10	
24	9.80 259		9.91 456		0.08 544	9.88 803		36
		15		26			10	
25	9.80 274		9.91 482		0.08 518	9.88 793		35
		16		25			11	
26	9.80 290		9.91 507		0.08 493	9.88 782		34
		15		26			10	
27	9.80 305		9.91 533		0.08 467	9.88 772		33
		15		26			11	
28	9.80 320		9.91 559		0.08 441	9.88 761		32
		16		26			10	
29	9.80 336		9.91 585		0.08 415	9.88 751		31
		15		26			10	
30	9.80 351		9.91 610		0.08 390	9.88 741		30
		15		26			11	
31	9.80 366		9.91 636		0.08 364	9.88 730		29
		16		26			10	
32	9.80 382		9.91 662		0.08 338	9.88 720		28
		15		25			11	
33	9.80 397		9.91 688		0.08 312	9.88 709		27
		15		26			10	
34	9.80 412		9.91 713		0.08 287	9.88 699		26
		16		26			11	
35	9.80 428		9.91 739		0.08 261	9.88 688		25
		15		26			10	
36	9.80 443		9.91 765		0.08 235	9.88 678		24
		15		26			10	
37	9.80 458		9.91 791		0.08 209	9.88 668		23
		15		25			11	
38	9.80 473		9.91 816		0.08 184	9.88 657		22
		16		26			10	
39	9.80 489		9.91 842		0.08 158	9.88 647		21
		15		26			11	
40	9.80 504		9.91 868		0.08 132	9.88 636		20
		15		25			10	
41	9.80 519		9.91 893		0.08 107	9.88 626		19
		15		26			11	
42	9.80 534		9.91 919		0.08 081	9.88 615		18
		16		26			10	
43	9.80 550		9.91 945		0.08 055	9.88 605		17
		15		26			11	
44	9.80 565		9.91 971		0.08 029	9.88 594		16
		15		25			10	
45	9.80 580		9.91 996		0.08 004	9.88 584		15
		15		26			11	
46	9.80 595		9.92 022		0.07 978	9.88 573		14
		15		26			10	
47	9.80 610		9.92 048		0.07 952	9.88 563		13
		15		25			11	
48	9.80 625		9.92 073		0.07 927	9.88 552		12
		16		26			10	
49	9.80 641		9.92 099		0.07 901	9.88 542		11
		15		26			11	
50	9.80 656		9.92 125		0.07 875	9.88 531		10
		15		25			10	
51	9.80 671		9.92 150		0.07 850	9.88 521		9
		15		26			11	
52	9.80 686		9.92 176		0.07 824	9.88 510		8
		15		26			11	
53	9.80 701		9.92 202		0.07 798	9.88 499		7
		15		25			10	
54	9.80 716		9.92 227		0.07 773	9.88 489		6
		15		26			11	
55	9.80 731		9.92 253		0.07 747	9.88 478		5
		15		26			10	
56	9.80 746		9.92 279		0.07 721	9.88 468		4
		16		25			11	
57	9.80 762		9.92 304		0.07 696	9.88 457		3
		15		26			10	
58	9.80 777		9.92 330		0.07 670	9.88 447		2
		15		26			11	
59	9.80 792		9.92 356		0.07 644	9.88 436		1
		15		25			11	
60	9.80 807		9.92 381		0.07 619	9.88 425		0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	′

P P		
	26	25
1	0.4	0.4
2	0.9	0.8
3	1.3	1.2
4	1.7	1.7
5	2.2	2.1
6	2.6	2.5
7	3.0	2.9
8	3.5	3.3
9	3.9	3.8
10	4.3	4.2
20	8.7	8.3
30	13.0	12.5
40	17.3	16.7
50	21.7	20.8

	16	15
1	0.3	0.2
2	0.5	0.5
3	0.8	0.8
4	1.1	1.0
5	1.3	1.2
6	1.6	1.5
7	1.9	1.8
8	2.1	2.0
9	2.4	2.2
10	2.7	2.5
20	5.3	5.0
30	8.0	7.5
40	10.7	10.0
50	13.3	12.5

	11	10
1	0.2	0.2
2	0.4	0.3
3	0.6	0.5
4	0.7	0.7
5	0.9	0.8
6	1.1	1.0
7	1.3	1.2
8	1.5	1.3
9	1.6	1.5
10	1.8	1.7
20	3.7	3.3
30	5.5	5.0
40	7.3	6.7
50	9.2	8.3

	11/26	11/25
0	1.2	1.1
1	3.5	3.4
2	5.9	5.7
3	8.3	7.9
4	10.6	10.2
5	13.0	12.5
6	15.4	14.8
7	17.7	17.1
8	20.1	19.3
9	22.5	21.6
10	24.8	23.9
11		

P P

′	L Sin	d	L Tan	c d	L Cot	L Cos	d	′
0	9.80 807		9.92 381		0.07 619	9.88 425		60
		15		26			10	
1	9.80 822		9.92 407		0.07 593	9.88 415	11	59
2	9.80 837	15	9.92 433	26	0.07 567	9.88 404	10	58
3	9.80 852	15	9.92 458	25	0.07 542	9.88 394	11	57
		15		26				
4	9.80 867		9.92 484		0.07 516	9.88 383	11	56
5	9.80 882	15	9.92 510	26	0.07 490	9.88 372	10	55
6	9.80 897	15	9.92 535	25	0.07 465	9.88 362	11	54
		15		26				
7	9.80 912		9.92 561		0.07 439	9.88 351	11	53
8	9.80 927	15	9.92 587	26	0.07 413	9.88 340	10	52
9	9.80 942	15	9.92 612	25	0.07 388	9.88 330	11	51
10	9.80 957	15	9.92 638	26	0.07 362	9.88 319	11	50
		15		25				
11	9.80 972		9.92 663		0.07 337	9.88 308	11	49
12	9.80 987	15	9.92 689	26	0.07 311	9.88 298	10	48
13	9.81 002	15	9.92 715	26	0.07 285	9.88 287	11	47
		15		25			11	
14	9.81 017		9.92 740		0.07 260	9.88 276	10	46
15	9.81 032	15	9.92 766	26	0.07 234	9.88 266	11	45
16	9.81 047	15	9.92 792	26	0.07 208	9.88 255	11	44
		14		25				
17	9.81 061		9.92 817		0.07 183	9.88 244	10	43
18	9.81 076	15	9.92 843	26	0.07 157	9.88 234	11	42
19	9.81 091	15	9.92 868	25	0.07 132	9.88 223	11	41
20	9.81 106	15	9.92 894	26	0.07 106	9.88 212	11	40
		15		26				
21	9.81 121		9.92 920		0.07 080	9.88 201	10	39
22	9.81 136	15	9.92 945	25	0.07 055	9.88 191	11	38
23	9.81 151	15	9.92 971	26	0.07 029	9.88 180	11	37
		15		25				
24	9.81 166		9.92 996		0.07 004	9.88 169	11	36
25	9.81 180	14	9.93 022	26	0.06 978	9.88 158	10	35
26	9.81 195	15	9.93 048	26	0.06 952	9.88 148	11	34
		15		25				
27	9.81 210		9.93 073		0.06 927	9.88 137	11	33
28	9.81 225	15	9.93 099	26	0.06 901	9.88 126	11	32
29	9.81 240	15	9.93 124	25	0.06 876	9.88 115	11	31
30	9.81 254	14	9.93 150	26	0.06 850	9.88 105	10	30
		15		26				
31	9.81 269		9.93 175		0.06 825	9.88 094	11	29
32	9.81 284	15	9.93 201	26	0.06 799	9.88 083	11	28
33	9.81 299	15	9.93 227	26	0.06 773	9.88 072	11	27
		15		25				
34	9.81 314		9.93 252		0.06 748	9.88 061	11	26
35	9.81 328	14	9.93 278	26	0.06 722	9.88 051	10	25
36	9.81 343	15	9.93 303	25	0.06 697	9.88 040	11	24
		15		26				
37	9.81 358		9.93 329		0.06 671	9.88 029	11	23
38	9.81 372	14	9.93 354	25	0.06 646	9.88 018	11	22
39	9.81 387	15	9.93 380	26	0.06 620	9.88 007	11	21
40	9.81 402	15	9.93 406	26	0.06 594	9.87 996	11	20
		15		25				
41	9.81 417		9.93 431		0.06 569	9.87 985	11	19
42	9.81 431	14	9.93 457	26	0.06 543	9.87 973	10	18
43	9.81 446	15	9.93 482	25	0.06 518	9.87 964	11	17
		15		26			11	
44	9.81 461		9.93 508		0.06 492	9.87 953		16
45	9.81 475	14	9.93 533	25	0.06 467	9.87 942	11	15
46	9.81 490	15	9.93 559	26	0.06 441	9.87 931	11	14
		15		25				
47	9.81 505		9.93 584		0.06 416	9.87 920	11	13
48	9.81 519	14	9.93 610	26	0.06 390	9.87 909	11	12
49	9.81 534	15	9.93 636	26	0.06 364	9.87 898	11	11
50	9.81 549	15	9.93 661	25	0.06 339	9.87 887	11	10
		14		26				
51	9.81 563		9.93 687		0.06 313	9.87 877	10	9
52	9.81 578	15	9.93 712	25	0.06 288	9.87 866	11	8
53	9.81 592	14	9.93 738	26	0.06 262	9.87 855	11	7
		15		25				
54	9.81 607		9.93 763		0.06 237	9.87 844	11	6
55	9.81 622	15	9.93 789	26	0.06 211	9.87 833	11	5
56	9.81 636	14	9.93 814	25	0.06 186	9.87 822	11	4
		15		26				
57	9.81 651		9.93 840		0.06 160	9.87 811	11	3
58	9.81 665	14	9.93 865	25	0.06 135	9.87 800	11	2
59	9.81 680	15	9.93 891	26	0.06 109	9.87 789	11	1
60	9.81 694	14	9.93 916	25	0.06 084	9.87 778	11	0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	′

	P	P
	26	25
1	0.4	0.4
2	0.9	0.8
3	1.3	1.2
4	1.7	1.7
5	2.2	2.1
6	2.6	2.5
7	3.0	2.9
8	3.5	3.3
9	3.9	3.8
10	4.3	4.2
20	8.7	8.3
30	13.0	12.5
40	17.3	16.7
50	21.7	20.8
	15	14
1	0.2	0.2
2	0.5	0.5
3	0.8	0.7
4	1.0	0.9
5	1.2	1.2
6	1.5	1.4
7	1.8	1.6
8	2.0	1.9
9	2.2	2.1
10	2.5	2.3
20	5.0	4.7
30	7.5	7.0
40	10.0	9.3
50	12.5	11.7
	11	10
1	0.2	0.2
2	0.4	0.3
3	0.6	0.5
4	0.7	0.7
5	0.9	0.8
6	1.1	1.0
7	1.3	1.2
8	1.5	1.3
9	1.6	1.5
10	1.8	1.7
20	3.7	3.3
30	5.5	5.0
40	7.3	6.7
50	9.2	8.3

	11/26	10/26	10/25
0	1.2	1.3	1.2
1	3.5	3.9	3.8
2	5.9	6.5	6.2
3	8.3	9.1	8.8
4	10.6	11.7	11.2
5	13.0	14.3	13.8
6	15.4	16.9	16.2
7	17.7	19.5	18.8
8	20.1	22.1	21.2
9	22.5	24.7	23.8
10	24.8	—	—
11			

	P	P

′	L Sin	d	L Tan	c d	L Cot	L Cos	d	′
0	9.81 694		9.93 916		0.06 084	9.87 778		60
		15		26			11	
1	9.81 709		9.93 942		0.06 058	9.87 767		59
		14		25			11	
2	9.81 723		9.93 967		0.06 033	9.87 756		58
		15		26			11	
3	9.81 738		9.93 993		0.06 007	9.87 745		57
		14		25			11	
4	9.81 752		9.94 018		0.05 982	9.87 734		56
		15		26			11	
5	9.81 767		9.94 044		0.05 956	9.87 723		55
		14		25			11	
6	9.81 781		9.94 069		0.05 931	9.87 712		54
		15		26			11	
7	9.81 796		9.94 095		0.05 905	9.87 701		53
		14		25			11	
8	9.81 810		9.94 120		0.05 880	9.87 690		52
		15		26			11	
9	9.81 825		9.94 146		0.05 854	9.87 679		51
		14		25			11	
10	9.81 839		9.94 171		0.05 829	9.87 668		50
		15		26			11	
11	9.81 854		9.94 197		0.05 803	9.87 657		49
		14		25			11	
12	9.81 868		9.94 222		0.05 778	9.87 646		48
		14		26			11	
13	9.81 882		9.94 248		0.05 752	9.87 635		47
		15		25			11	
14	9.81 897		9.94 273		0.05 727	9.87 624		46
		14		26			11	
15	9.81 911		9.94 299		0.05 701	9.87 613		45
		15		25			12	
16	9.81 926		9.94 324		0.05 676	9.87 601		44
		14		26			11	
17	9.81 940		9.94 350		0.05 650	9.87 590		43
		15		25			11	
18	9.81 955		9.94 375		0.05 625	9.87 579		42
		14		26			11	
19	9.81 969		9.94 401		0.05 599	9.87 568		41
		14		25			11	
20	9.81 983		9.94 426		0.05 574	9.87 557		40
		15		26			11	
21	9.81 998		9.94 452		0.05 548	9.87 546		39
		14		25			11	
22	9.82 012		9.94 477		0.05 523	9.87 535		38
		14		26			11	
23	9.82 026		9.94 503		0.05 497	9.87 524		37
		15		25			11	
24	9.82 041		9.94 528		0.05 472	9.87 513		36
		14		26			12	
25	9.82 055		9.94 554		0.05 446	9.87 501		35
		14		25			11	
26	9.82 069		9.94 579		0.05 421	9.87 490		34
		15		25			11	
27	9.82 084		9.94 604		0.05 396	9.87 479		33
		14		26			11	
28	9.82 098		9.94 630		0.05 370	9.87 468		32
		14		25			11	
29	9.82 112		9.94 655		0.05 345	9.87 457		31
		14		26			11	
30	9.82 126		9.94 681		0.05 319	9.87 446		30
		15		25			12	
31	9.82 141		9.94 706		0.05 294	9.87 434		29
		14		26			11	
32	9.82 155		9.94 732		0.05 268	9.87 423		28
		14		25			11	
33	9.82 169		9.94 757		0.05 243	9.87 412		27
		14		26			11	
34	9.82 184		9.94 783		0.05 217	9.87 401		26
		15		25			11	
35	9.82 198		9.94 808		0.05 192	9.87 390		25
		14		26			12	
36	9.82 212		9.94 834		0.05 166	9.87 378		24
		14		25			11	
37	9.82 226		9.94 859		0.05 141	9.87 367		23
		14		25			11	
38	9.82 240		9.94 884		0.05 116	9.87 356		22
		15		26			11	
39	9.82 255		9.94 910		0.05 090	9.87 345		21
		14		25			11	
40	9.82 269		9.94 935		0.05 065	9.87 334		20
		14		26			12	
41	9.82 283		9.94 961		0.05 039	9.87 322		19
		14		25			11	
42	9.82 297		9.94 986		0.05 014	9.87 311		18
		14		26			11	
43	9.82 311		9.95 012		0.04 988	9.87 300		17
		15		25			12	
44	9.82 326		9.95 037		0.04 963	9.87 288		16
		14		25			11	
45	9.82 340		9.95 062		0.04 938	9.87 277		15
		14		26			11	
46	9.82 354		9.95 088		0.04 912	9.87 266		14
		14		25			11	
47	9.82 368		9.95 113		0.04 887	9.87 255		13
		14		26			12	
48	9.82 382		9.95 139		0.04 861	9.87 243		12
		14		25			11	
49	9.82 396		9.95 164		0.04 836	9.87 232		11
		14		26			11	
50	9.82 410		9.95 190		0.04 810	9.87 221		10
		14		25			12	
51	9.82 424		9.95 215		0.04 785	9.87 209		9
		15		25			11	
52	9.82 439		9.95 240		0.04 760	9.87 198		8
		14		26			11	
53	9.82 453		9.95 266		0.04 734	9.87 187		7
		14		25			12	
54	9.82 467		9.95 291		0.04 709	9.87 175		6
		14		26			11	
55	9.82 481		9.95 317		0.04 683	9.87 164		5
		14		25			11	
56	9.82 495		9.95 342		0.04 658	9.87 153		4
		14		26			12	
57	9.82 509		9.95 368		0.04 632	9.87 141		3
		14		25			11	
58	9.82 523		9.95 393		0.04 607	9.87 130		2
		14		25			11	
59	9.82 537		9.95 418		0.04 582	9.87 119		1
		14		26			12	
60	9.82 551		9.95 444		0.04 556	9.87 107		0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	′

P	P	
	26	25
1	0.4	0.4
2	0.9	0.8
3	1.3	1.2
4	1.7	1.7
5	2.2	2.1
6	2.6	2.5
7	3.0	2.9
8	3.5	3.3
9	3.9	3.8
10	4.3	4.2
20	8.7	8.3
30	13.0	12.5
40	17.3	16.7
50	21.7	20.8

P	P	
	15	14
1	0.2	0.2
2	0.5	0.5
3	0.8	0.7
4	1.0	0.9
5	1.2	1.2
6	1.5	1.4
7	1.8	1.6
8	2.0	1.9
9	2.2	2.1
10	2.5	2.3
20	5.0	4.7
30	7.5	7.0
40	10.0	9.3
50	12.5	11.7

P	P	
	12	11
1	0.2	0.2
2	0.4	0.4
3	0.6	0.6
4	0.8	0.7
5	1.0	0.9
6	1.2	1.1
7	1.4	1.3
8	1.6	1.5
9	1.8	1.6
10	2.0	1.8
20	4.0	3.7
30	6.0	5.5
40	8.0	7.3
50	10.0	9.2

	12 / 26	12 / 25	11 / 25
0	1.1	1.1	1.1
1	3.2	3.1	3.4
2	5.4	5.2	5.7
3	7.6	7.3	7.9
4	9.8	9.4	10.2
5	11.9	11.5	12.5
6	14.1	13.5	14.8
7	16.2	15.6	17.1
8	18.4	17.7	19.3
9	20.6	19.8	21.6
10	22.8	21.9	23.9
11	24.9	23.9	—
12			

P	P

′	L Sin	d	L Tan	c d	L Cot	L Cos	d	′
0	9.82 551	14	9.95 444	25	0.04 556	9.87 107	11	60
1	9.82 565	14	9.95 469	26	0.04 531	9.87 096	11	59
2	9.82 579	14	9.95 495	25	0.04 505	9.87 085	12	58
3	9.82 593	14	9.95 520	25	0.04 480	9.87 073	11	57
4	9.82 607	14	9.95 545	26	0.04 455	9.87 062	12	56
5	9.82 621	14	9.95 571	25	0.04 429	9.87 050	11	55
6	9.82 635	14	9.95 596	26	0.04 404	9.87 039	11	54
7	9.82 649	14	9.95 622	25	0.04 378	9.87 028	12	53
8	9.82 663	14	9.95 647	25	0.04 353	9.87 016	11	52
9	9.82 677	14	9.95 672	26	0.04 328	9.87 005	12	51
10	9.82 691	14	9.95 698	25	0.04 302	9.86 993	11	50
11	9.82 705	14	9.95 723	25	0.04 277	9.86 982	12	49
12	9.82 719	14	9.95 748	26	0.04 252	9.86 970	11	48
13	9.82 733	14	9.95 774	25	0.04 226	9.86 959	12	47
14	9.82 747	14	9.95 799	26	0.04 201	9.86 947	11	46
15	9.82 761	14	9.95 825	25	0.04 175	9.86 936	12	45
16	9.82 775	13	9.95 850	25	0.04 150	9.86 924	11	44
17	9.82 788	14	9.95 875	26	0.04 125	9.86 913	11	43
18	9.82 802	14	9.95 901	25	0.04 099	9.86 902	12	42
19	9.82 816	14	9.95 926	26	0.04 074	9.86 890	11	41
20	9.82 830	14	9.95 952	25	0.04 048	9.86 879	12	40
21	9.82 844	14	9.95 977	25	0.04 023	9.86 867	12	39
22	9.82 858	14	9.96 002	26	0.03 998	9.86 855	11	38
23	9.82 872	13	9.96 028	25	0.03 972	9.86 844	12	37
24	9.82 885	14	9.96 053	25	0.03 947	9.86 832	11	36
25	9.82 899	14	9.96 078	26	0.03 922	9.86 821	12	35
26	9.82 913	14	9.96 104	25	0.03 896	9.86 809	11	34
27	9.82 927	14	9.96 129	26	0.03 871	9.86 798	12	33
28	9.82 941	14	9.96 155	25	0.03 845	9.86 786	11	32
29	9.82 955	13	9.96 180	25	0.03 820	9.86 775	12	31
30	9.82 968	14	9.96 205	26	0.03 795	9.86 763	11	30
31	9.82 982	14	9.96 231	25	0.03 769	9.86 752	12	29
32	9.82 996	14	9.96 256	25	0.03 744	9.86 740	12	28
33	9.83 010	13	9.96 281	26	0.03 719	9.86 728	11	27
34	9.83 023	14	9.96 307	25	0.03 693	9.86 717	12	26
35	9.83 037	14	9.96 332	25	0.03 668	9.86 705	11	25
36	9.83 051	14	9.96 357	26	0.03 643	9.86 694	12	24
37	9.83 065	13	9.96 383	25	0.03 617	9.86 682	12	23
38	9.83 078	14	9.96 408	25	0.03 592	9.86 670	11	22
39	9.83 092	14	9.96 433	26	0.03 567	9.86 659	12	21
40	9.83 106	14	9.96 459	25	0.03 541	9.86 647	12	20
41	9.83 120	13	9.96 484	26	0.03 516	9.86 635	11	19
42	9.83 133	14	9.96 510	25	0.03 490	9.86 624	12	18
43	9.83 147	14	9.96 535	25	0.03 465	9.86 612	12	17
44	9.83 161	13	9.96 560	26	0.03 440	9.86 600	11	16
45	9.83 174	14	9.96 586	25	0.03 414	9.86 589	12	15
46	9.83 188	14	9.96 611	25	0.03 389	9.86 577	12	14
47	9.83 202	13	9.96 636	26	0.03 364	9.86 565	11	13
48	9.83 215	14	9.96 662	25	0.03 338	9.86 554	12	12
49	9.83 229	13	9.96 687	25	0.03 313	9.86 542	12	11
50	9.83 242	14	9.96 712	26	0.03 288	9.86 530	12	10
51	9.83 256	14	9.96 738	25	0.03 262	9.86 518	12	9
52	9.83 270	13	9.96 763	25	0.03 237	9.86 507	11	8
53	9.83 283	14	9.96 788	26	0.03 212	9.86 495	12	7
54	9.83 297	14	9.96 814	25	0.03 186	9.86 483	12	6
55	9.83 310	14	9.96 839	25	0.03 161	9.86 472	11	5
56	9.83 324	14	9.96 864	26	0.03 136	9.86 460	12	4
57	9.83 338	13	9.96 890	25	0.03 110	9.86 448	12	3
58	9.83 351	14	9.96 915	25	0.03 085	9.86 436	12	2
59	9.83 365	13	9.96 940	26	0.03 060	9.86 425	11	1
60	9.83 378		9.96 966		0.03 034	9.86 413	12	0
′	L Cos	d	L Cot	c d	L Tan	L Sin	d	′

P	P	
	26	25
1	0.4	0.4
2	0.9	0.8
3	1.3	1.2
4	1.7	1.7
5	2.2	2.1
6	2.6	2.5
7	3.0	2.9
8	3.5	3.3
9	3.9	3.8
10	4.3	4.2
20	8.7	8.3
30	13.0	12.5
40	17.3	16.7
50	21.7	20.8

P	P	
	14	13
1	0.2	0.2
2	0.5	0.4
3	0.7	0.6
4	0.9	0.9
5	1.2	1.1
6	1.4	1.3
7	1.6	1.5
8	1.9	1.7
9	2.1	2.0
10	2.3	2.2
20	4.7	4.3
30	7.0	6.5
40	9.3	8.7
50	11.7	10.8

P	P	
	12	11
1	0.2	0.2
2	0.4	0.4
3	0.6	0.6
4	0.8	0.7
5	1.0	0.9
6	1.2	1.1
7	1.4	1.3
8	1.6	1.5
9	1.8	1.6
10	2.0	1.8
20	4.0	3.7
30	6.0	5.5
40	8.0	7.3
50	10.0	9.2

	12/26	11/26	11/25
0	1.1	1.2	1.1
1	3.2	3.5	3.4
2	5.4	5.9	5.7
3	7.6	8.3	7.9
4	9.8	10.6	10.2
5	11.9	13.0	12.5
6	14.1	15.4	14.8
7	16.2	17.7	17.1
8	18.4	20.1	19.3
9	20.6	22.5	21.6
10	22.8	24.8	23.9
11	24.9	—	—
12			

′	L Sin	d	L Tan	c d	L Cot	L Cos	d	
0	9.83 378		9.96 966		0.03 034	9.86 413		60
		14		25			12	
1	9.83 392		9.96 991		0.03 009	9.86 401		59
		13		25			12	
2	9.83 405		9.97 016		0.02 984	9.86 389		58
		14		26			12	
3	9.83 419		9.97 042		0.02 958	9.86 377		57
		13		25			11	
4	9.83 432		9.97 067		0.02 933	9.86 366		56
		14		25			12	
5	9.83 446		9.97 092		0.02 908	9.86 354		55
		13		26			12	
6	9.83 459		9.97 118		0.02 882	9.86 342		54
		14		25			12	
7	9.83 473		9.97 143		0.02 857	9.86 330		53
8	9.83 486	13	9.97 168	25	0.02 832	9.86 318	12	52
9	9.83 500	14	9.97 193	25	0.02 807	9.86 306	12	51
10	9.83 513	13	9.97 219	26	0.02 781	9.86 295	11	50
		14		25			12	
11	9.83 527		9.97 244		0.02 756	9.86 283		49
12	9.83 540	13	9.97 269	25	0.02 731	9.86 271	12	48
13	9.83 554	14	9.97 295	26	0.02 705	9.86 259	12	47
		13		25			12	
14	9.83 567		9.97 320		0.02 680	9.86 247		46
15	9.83 581	14	9.97 345	25	0.02 655	9.86 235	12	45
16	9.83 594	13	9.97 371	26	0.02 629	9.86 223	12	44
		14		25			12	
17	9.83 608		9.97 396		0.02 604	9.86 211		43
18	9.83 621	13	9.97 421	25	0.02 579	9.86 200	11	42
19	9.83 634	13	9.97 447	26	0.02 553	9.86 188	12	41
20	9.83 648	14	9.97 472	25	0.02 528	9.86 176	12	40
		13		25			12	
21	9.83 661		9.97 497		0.02 503	9.86 164		39
22	9.83 674	13	9.97 523	26	0.02 477	9.86 152	12	38
23	9.83 688	14	9.97 548	25	0.02 452	9.86 140	12	37
		13		25			12	
24	9.83 701		9.97 573		0.02 427	9.86 128		36
25	9.83 715	14	9.97 598	25	0.02 402	9.86 116	12	35
26	9.83 728	13	9.97 624	26	0.02 376	9.86 104	12	34
		13		25			12	
27	9.83 741		9.97 649		0.02 351	9.86 092		33
28	9.83 755	14	9.97 674	25	0.02 326	9.86 080	12	32
29	9.83 768	13	9.97 700	26	0.02 300	9.86 068	12	31
30	9.83 781	13	9.97 725	25	0.02 275	9.86 056	12	30
		14		25			12	
31	9.83 795		9.97 750		0.02 250	9.86 044		29
32	9.83 808	13	9.97 776	26	0.02 224	9.86 032	12	28
33	9.83 821	13	9.97 801	25	0.02 199	9.86 020	12	27
		13		25			12	
34	9.83 834		9.97 826		0.02 174	9.86 008		26
35	9.83 848	14	9.97 851	25	0.02 149	9.85 996	12	25
36	9.83 861	13	9.97 877	26	0.02 123	9.85 984	12	24
		13		25			12	
37	9.83 874		9.97 902		0.02 098	9.85 972		23
38	9.83 887	13	9.97 927	25	0.02 073	9.85 960	12	22
39	9.83 901	14	9.97 953	26	0.02 047	9.85 948	12	21
40	9.83 914	13	9.97 978	25	0.02 022	9.85 936	12	20
		13		25			12	
41	9.83 927		9.98 003		0.01 997	9.85 924		19
42	9.83 940	13	9.98 029	26	0.01 971	9.85 912	12	18
43	9.83 954	14	9.98 054	25	0.01 946	9.85 900	12	17
		13		25			12	
44	9.83 967		9.98 079		0.01 921	9.85 888		16
45	9.83 980	13	9.98 104	25	0.01 896	9.85 876	12	15
46	9.83 993	13	9.98 130	26	0.01 870	9.85 864	12	14
		13		25			13	
47	9.84 006		9.98 155		0.01 845	9.85 851		13
48	9.84 020	14	9.98 180	25	0.01 820	9.85 839	12	12
49	9.84 033	13	9.98 206	26	0.01 794	9.85 827	12	11
50	9.84 046	13	9.98 231	25	0.01 769	9.85 815	12	10
		13		25			12	
51	9.84 059		9.98 256		0.01 744	9.85 803		9
52	9.84 072	13	9.98 281	25	0.01 719	9.85 791	12	8
53	9.84 085	13	9.98 307	26	0.01 693	9.85 779	12	7
		13		25			13	
54	9.84 098		9.98 332		0.01 668	9.85 766		6
55	9.84 112	14	9.98 357	25	0.01 643	9.85 754	12	5
56	9.84 125	13	9.98 383	26	0.01 617	9.85 742	12	4
		13		25			12	
57	9.84 138		9.98 408		0.01 592	9.85 730		3
58	9.84 151	13	9.98 433	25	0.01 567	9.85 718	12	2
59	9.84 164	13	9.98 458	25	0.01 542	9.85 706	12	1
60	9.84 177	13	9.98 484	26	0.01 516	9.85 693	13	0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	′

P P	
	26 | 25
1	2.6 | 2.5
2	5.2 | 5.0
3	7.8 | 7.5
4	10.4 | 10.0
5	13.0 | 12.5
6	15.6 | 15.0
7	18.2 | 17.5
8	20.8 | 20.0
9	23.4 | 22.5
10	26.0 | 25.0
20	52.0 | 50.0
30	78.0 | 75.0
40	104.0 | 100.0
50	130.0 | 125.0

	14 | 13
1	1.4 | 1.3
2	2.8 | 2.6
3	4.2 | 3.9
4	5.6 | 5.2
5	7.0 | 6.5
6	8.4 | 7.8
7	9.8 | 9.1
8	11.2 | 10.4
9	12.6 | 11.7
10	14.0 | 13.0
20	28.0 | 26.0
30	42.0 | 39.0
40	56.0 | 52.0
50	70.0 | 65.0

	12 | 11
1	1.2 | 1.1
2	2.4 | 2.2
3	3.6 | 3.3
4	4.8 | 4.4
5	6.0 | 5.5
6	7.2 | 6.6
7	8.4 | 7.7
8	9.6 | 8.8
9	10.8 | 9.9
10	12.0 | 11.0
20	24.0 | 22.0
30	36.0 | 33.0
40	48.0 | 44.0
50	60.0 | 55.0

	13 | 13 | 12
	26 | 25 | 25
0	— | — | —
1	1.0 | 0.9 | 1.1
2	3.0 | 2.9 | 3.1
3	5.0 | 4.8 | 5.2
4	7.0 | 6.7 | 7.3
5	9.0 | 8.7 | 9.4
6	11.0 | 10.6 | 11.5
7	13.0 | 12.5 | 13.5
8	15.0 | 14.4 | 15.6
9	17.0 | 16.3 | 17.7
10	19.0 | 18.3 | 19.8
11	21.0 | 20.2 | 21.9
12	23.0 | 22.1 | 23.9
13	25.0 | 24.1 | —

P P

′	L Sin	d	L Tan	c d	L Cot	L Cos	d	
0	9.84 177		9.98 484		0.01 516	9.85 693		60
1	9.84 190	13	9.98 509	25	0.01 491	9.85 681	12	59
2	9.84 203	13	9.98 534	25	0.01 466	9.85 669	12	58
3	9.84 216	13	9.98 560	26	0.01 440	9.85 657	12	57
4	9.84 229	13	9.98 585	25	0.01 415	9.85 645	12	56
5	9.84 242	13	9.98 610	25	0.01 390	9.85 632	13	55
6	9.84 255	13	9.98 635	25	0.01 365	9.85 620	12	54
7	9.84 269	14	9.98 661	26	0.01 339	9.85 608	12	53
8	9.84 282	13	9.98 686	25	0.01 314	9.85 596	12	52
9	9.84 295	13	9.98 711	25	0.01 289	9.85 583	13	51
10	9.84 308	13	9.98 737	26	0.01 263	9.85 571	12	50
11	9.84 321	13	9.98 762	25	0.01 238	9.85 559	12	49
12	9.84 334	13	9.98 787	25	0.01 213	9.85 547	12	48
13	9.84 347	13	9.98 812	25	0.01 188	9.85 534	13	47
14	9.84 360	13	9.98 838	26	0.01 162	9.85 522	12	46
15	9.84 373	13	9.98 863	25	0.01 137	9.85 510	12	45
16	9.84 385	12	9.98 888	25	0.01 112	9.85 497	13	44
17	9.84 398	13	9.98 913	25	0.01 087	9.85 485	12	43
18	9.84 411	13	9.98 939	26	0.01 061	9.85 473	12	42
19	9.84 424	13	9.98 964	25	0.01 036	9.85 460	13	41
20	9.84 437	13	9.98 989	25	0.01 011	9.85 448	12	40
21	9.84 450	13	9.99 015	26	0.00 985	9.85 436	12	39
22	9.84 463	13	9.99 040	25	0.00 960	9.85 423	13	38
23	9.84 476	13	9.99 065	25	0.00 935	9.85 411	12	37
24	9.84 489	13	9.99 090	25	0.00 910	9.85 399	12	36
25	9.84 502	13	9.99 116	26	0.00 884	9.85 386	13	35
26	9.84 515	13	9.99 141	25	0.00 859	9.85 374	12	34
27	9.84 528	12	9.99 166	25	0.00 834	9.85 361	13	33
28	9.84 540	13	9.99 191	25	0.00 809	9.85 349	12	32
29	9.84 553	13	9.99 217	26	0.00 783	9.85 337	12	31
30	9.84 566	13	9.99 242	25	0.00 758	9.85 324	13	30
31	9.84 579	13	9.99 267	25	0.00 733	9.85 312	12	29
32	9.84 592	13	9.99 293	26	0.00 707	9.85 299	13	28
33	9.84 605	13	9.99 318	25	0.00 682	9.85 287	12	27
34	9.84 618	13	9.99 343	25	0.00 657	9.85 274	13	26
35	9.84 630	12	9.99 368	25	0.00 632	9.85 262	12	25
36	9.84 643	13	9.99 394	26	0.00 606	9.85 250	12	24
37	9.84 656	13	9.99 419	25	0.00 581	9.85 237	13	23
38	9.84 669	13	9.99 444	25	0.00 556	9.85 225	12	22
39	9.84 682	13	9.99 469	25	0.00 531	9.85 212	13	21
40	9.84 694	12	9.99 495	26	0.00 505	9.85 200	12	20
41	9.84 707	13	9.99 520	25	0.00 480	9.85 187	13	19
42	9.84 720	13	9.99 545	25	0.00 455	9.85 175	12	18
43	9.84 733	13	9.99 570	25	0.00 430	9.85 162	13	17
44	9.84 745	12	9.99 596	26	0.00 404	9.85 150	12	16
45	9.84 758	13	9.99 621	25	0.00 379	9.85 137	13	15
46	9.84 771	13	9.99 646	25	0.00 354	9.85 125	12	14
47	9.84 784	13	9.99 672	26	0.00 328	9.85 112	13	13
48	9.84 796	12	9.99 697	25	0.00 303	9.85 100	12	12
49	9.84 809	13	9.99 722	25	0.00 278	9.85 087	13	11
50	9.84 822	13	9.99 747	25	0.00 253	9.85 074	13	10
51	9.84 835	13	9.99 773	26	0.00 227	9.85 062	12	9
52	9.84 847	12	9.99 798	25	0.00 202	9.85 049	13	8
53	9.84 860	13	9.99 823	25	0.00 177	9.85 037	12	7
54	9.84 873	13	9.99 848	25	0.00 152	9.85 024	13	6
55	9.84 885	12	9.99 874	26	0.00 126	9.85 012	12	5
56	9.84 898	13	9.99 899	25	0.00 101	9.84 999	13	4
57	9.84 911	13	9.99 924	25	0.00 076	9.84 986	13	3
58	9.84 923	12	9.99 949	25	0.00 051	9.84 974	12	2
59	9.84 936	13	9.99 975	26	0.00 025	9.84 961	13	1
60	9.84 949	13	0.00 000	25	0.00 000	9.84 949	12	0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	′

	P P	
	26	25
1	0.4	0.4
2	0.9	0.8
3	1.3	1.2
4	1.7	1.7
5	2.2	2.1
6	2.6	2.5
7	3.0	2.9
8	3.5	3.3
9	3.9	3.8
10	4.3	4.2
20	8.7	8.3
30	13.0	12.5
40	17.3	16.7
50	21.7	20.8

	14	13	12
1	0.2	0.2	0.2
2	0.5	0.4	0.4
3	0.7	0.6	0.6
4	0.9	0.9	0.8
5	1.2	1.1	1.0
6	1.4	1.3	1.2
7	1.6	1.5	1.4
8	1.9	1.7	1.6
9	2.1	2.0	1.8
10	2.3	2.2	2.0
20	4.7	4.3	4.0
30	7.0	6.5	6.0
40	9.3	8.7	8.0
50	11.7	10.8	10.0

	13 / 26	13 / 25
0	1.0	0.9
1	3.0	2.9
2	5.0	4.8
3	7.0	6.7
4	9.0	8.7
5	11.0	10.6
6	13.0	12.5
7	15.0	14.4
8	17.0	16.3
9	19.0	18.3
10	21.0	20.2
11	23.0	22.1
12	25.0	24.1
13		

	12 / 26	12 / 25
0	1.1	1.1
1	3.2	3.1
2	5.4	5.2
3	7.6	7.3
4	9.8	9.4
5	11.9	11.5
6	14.1	13.5
7	16.2	15.6
8	18.4	17.7
9	20.6	19.8
10	22.8	21.9
11	24.9	23.9
12		

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TABLE OF THE NATURAL

TRIGONOMETRIC FUNCTIONS

FROM MINUTE TO MINUTE.

′	Sin	Tan	Cot	Cos	
0	0.0000	0.0000	∞	1.0000	60
1	0.0003	0.0003	3437.75	1.0000	59
2	0.0006	0.0006	1718.87	1.0000	58
3	0.0009	0.0009	1145.92	1.0000	57
4	0.0012	0.0012	859.436	1.0000	56
5	0.0015	0.0015	687.549	1.0000	55
6	0.0017	0.0017	572.957	1.0000	54
7	0.0020	0.0020	491.106	1.0000	53
8	0.0023	0.0023	429.718	1.0000	52
9	0.0026	0.0026	381.971	1.0000	51
10	0.0029	0.0029	343.774	1.0000	50
11	0.0032	0.0032	312.521	1.0000	49
12	0.0035	0.0035	286.478	1.0000	48
13	0.0038	0.0038	264.441	1.0000	47
14	0.0041	0.0041	245.552	1.0000	46
15	0.0044	0.0044	229.182	1.0000	45
16	0.0047	0.0047	214.858	1.0000	44
17	0.0049	0.0049	202.219	1.0000	43
18	0.0052	0.0052	190.984	1.0000	42
19	0.0055	0.0055	180.932	1.0000	41
20	0.0058	0.0058	171.885	1.0000	40
21	0.0061	0.0061	163.700	1.0000	39
22	0.0064	0.0064	156.259	1.0000	38
23	0.0067	0.0067	149.465	1.0000	37
24	0.0070	0.0070	143.237	1.0000	36
25	0.0073	0.0073	137.507	1.0000	35
26	0.0076	0.0076	132.219	1.0000	34
27	0.0079	0.0079	127.321	1.0000	33
28	0.0081	0.0081	122.774	1.0000	32
29	0.0084	0.0084	118.540	1.0000	31
30	0.0087	0.0087	114.589	1.0000	30
31	0.0090	0.0090	110.892	1.0000	29
32	0.0093	0.0093	107.426	1.0000	28
33	0.0096	0.0096	104.171	1.0000	27
34	0.0099	0.0099	101.107	1.0000	26
35	0.0102	0.0102	98.2179	0.9999	25
36	0.0105	0.0105	95.4895	0.9999	24
37	0.0108	0.0108	92.9085	0.9999	23
38	0.0111	0.0111	90.4633	0.9999	22
39	0.0113	0.0113	88.1436	0.9999	21
40	0.0116	0.0116	85.9398	0.9999	20
41	0.0119	0.0119	83.8435	0.9999	19
42	0.0122	0.0122	81.8470	0.9999	18
43	0.0125	0.0125	79.9434	0.9999	17
44	0.0128	0.0128	78.1263	0.9999	16
45	0.0131	0.0131	76.3900	0.9999	15
46	0.0134	0.0134	74.7292	0.9999	14
47	0.0137	0.0137	73.1390	0.9999	13
48	0.0140	0.0140	71.6151	0.9999	12
49	0.0143	0.0143	70.1533	0.9999	11
50	0.0145	0.0145	68.7501	0.9999	10
51	0.0148	0.0148	67.4019	0.9999	9
52	0.0151	0.0151	66.1055	0.9999	8
53	0.0154	0.0154	64.8580	0.9999	7
54	0.0157	0.0157	63.6567	0.9999	6
55	0.0160	0.0160	62.4992	0.9999	5
56	0.0163	0.0163	61.3829	0.9999	4
57	0.0166	0.0166	60.3058	0.9999	3
58	0.0169	0.0169	59.2659	0.9999	2
59	0.0172	0.0172	58.2612	0.9999	1
60	0.0175	0.0175	57.2900	0.9998	0
	Cos	Cot	Tan	Sin	

′	Sin	Tan	Cot	Cos	
0	0.0175	0.0175	57.2900	0.9998	60
1	0.0177	0.0177	56.3506	0.9998	59
2	0.0180	0.0180	55.4415	0.9998	58
3	0.0183	0.0183	54.5613	0.9998	57
4	0.0186	0.0186	53.7086	0.9998	56
5	0.0189	0.0189	52.8821	0.9998	55
6	0.0192	0.0192	52.0807	0.9998	54
7	0.0195	0.0195	51.3032	0.9998	53
8	0.0198	0.0198	50.5485	0.9998	52
9	0.0201	0.0201	49.8157	0.9998	51
10	0.0204	0.0204	49.1039	0.9998	50
11	0.0207	0.0207	48.4121	0.9998	49
12	0.0209	0.0209	47.7395	0.9998	48
13	0.0212	0.0212	47.0853	0.9998	47
14	0.0215	0.0215	46.4489	0.9998	46
15	0.0218	0.0218	45.8294	0.9998	45
16	0.0221	0.0221	45.2261	0.9998	44
17	0.0224	0.0224	44.6386	0.9997	43
18	0.0227	0.0227	44.0661	0.9997	42
19	0.0230	0.0230	43.5081	0.9997	41
20	0.0233	0.0233	42.9641	0.9997	40
21	0.0236	0.0236	42.4335	0.9997	39
22	0.0239	0.0239	41.9158	0.9997	38
23	0.0241	0.0241	41.4106	0.9997	37
24	0.0244	0.0244	40.9174	0.9997	36
25	0.0247	0.0247	40.4358	0.9997	35
26	0.0250	0.0250	39.9655	0.9997	34
27	0.0253	0.0253	39.5059	0.9997	33
28	0.0256	0.0256	39.0568	0.9997	32
29	0.0259	0.0259	38.6177	0.9997	31
30	0.0262	0.0262	38.1885	0.9997	30
31	0.0265	0.0265	37.7686	0.9996	29
32	0.0268	0.0268	37.3579	0.9996	28
33	0.0270	0.0271	36.9560	0.9996	27
34	0.0273	0.0274	36.5627	0.9996	26
35	0.0276	0.0276	36.1776	0.9996	25
36	0.0279	0.0279	35.8006	0.9996	24
37	0.0282	0.0282	35.4312	0.9996	23
38	0.0285	0.0285	35.0695	0.9996	22
	0.0288	0.0288	34.7151	0.9996	21
40	0.0291	0.0291	34.3678	0.9996	20
41	0.0294	0.0294	34.0273	0.9996	19
42	0.0297	0.0297	33.6935	0.9996	18
43	0.0300	0.0300	33.3662	0.9996	17
44	0.0302	0.0303	33.0452	0.9995	16
45	0.0305	0.0306	32.7303	0.9995	15
46	0.0308	0.0308	32.4213	0.9995	14
47	0.0311	0.0311	32.1181	0.9995	13
48	0.0314	0.0314	31.8205	0.9995	12
49	0.0317	0.0317	31.5284	0.9995	11
50	0.0320	0.0320	31.2416	0.9995	10
51	0.0323	0.0323	30.9599	0.9995	9
52	0.0326	0.0326	30.6833	0.9995	8
53	0.0329	0.0329	30.4116	0.9995	7
54	0.0332	0.0332	30.1446	0.9995	6
55	0.0334	0.0335	29.8823	0.9994	5
56	0.0337	0.0338	29.6245	0.9994	4
57	0.0340	0.0340	29.3711	0.9994	3
58	0.0343	0.0343	29.1220	0.9994	2
59	0.0346	0.0346	28.8771	0.9994	1
60	0.0349	0.0349	28.6363	0.9994	0
	Cos	Cot	Tan	Sin	

′	Sin	Tan	Cot	Cos	
0	0.0349	0.0349	28.6363	0.9994	60
1	0.0352	0.0352	28.3994	0.9994	59
2	0.0355	0.0355	28.1664	0.9994	58
3	0.0358	0.0358	27.9372	0.9994	57
4	0.0361	0.0361	27.7117	0.9993	56
5	0.0364	0.0364	27.4899	0.9993	55
6	0.0366	0.0367	27.2715	0.9993	54
7	0.0369	0.0370	27.0566	0.9993	53
8	0.0372	0.0373	26.8450	0.9993	52
9	0.0375	0.0375	26.6367	0.9993	51
10	0.0378	0.0378	26.4316	0.9993	50
11	0.0381	0.0381	26.2296	0.9993	49
12	0.0384	0.0384	26.0307	0.9993	48
13	0.0387	0.0387	25.8348	0.9993	47
14	0.0390	0.0390	25.6418	0.9992	46
15	0.0393	0.0393	25.4517	0.9992	45
16	0.0396	0.0396	25.2644	0.9992	44
17	0.0398	0.0399	25.0798	0.9992	43
18	0.0401	0.0402	24.8978	0.9992	42
19	0.0404	0.0405	24.7185	0.9992	41
20	0.0407	0.0407	24.5418	0.9992	40
21	0.0410	0.0410	24.3675	0.9992	39
22	0.0413	0.0413	24.1957	0.9991	38
23	0.0416	0.0416	24.0263	0.9991	37
24	0.0419	0.0419	23.8593	0.9991	36
25	0.0422	0.0422	23.6945	0.9991	35
26	0.0425	0.0425	23.5321	0.9991	34
27	0.0427	0.0428	23.3718	0.9991	33
28	0.0430	0.0431	23.2137	0.9991	32
29	0.0433	0.0434	23.0577	0.9991	31
30	0.0436	0.0437	22.9038	0.9990	30
31	0.0439	0.0440	22.7519	0.9990	29
32	0.0442	0.0442	22.6020	0.9990	28
33	0.0445	0.0445	22.4541	0.9990	27
34	0.0448	0.0448	22.3081	0.9990	26
35	0.0451	0.0451	22.1640	0.9990	25
36	0.0454	0.0454	22.0217	0.9990	24
37	0.0457	0.0457	21.8813	0.9990	23
38	0.0459	0.0460	21.7426	0.9989	22
39	0.0462	0.0463	21.6056	0.9989	21
40	0.0465	0.0466	21.4704	0.9989	20
41	0.0468	0.0469	21.3369	0.9989	19
42	0.0471	0.0472	21.2049	0.9989	18
43	0.0474	0.0475	21.0747	0.9989	17
44	0.0477	0.0477	20.9460	0.9989	16
45	0.0480	0.0480	20.8188	0.9988	15
46	0.0483	0.0483	20.6932	0.9988	14
47	0.0486	0.0486	20.5691	0.9988	13
48	0.0488	0.0489	20.4465	0.9988	12
49	0.0491	0.0492	20.3253	0.9988	11
50	0.0494	0.0495	20.2056	0.9988	10
51	0.0497	0.0498	20.0872	0.9988	9
52	0.0500	0.0501	19.9702	0.9987	8
53	0.0503	0.0504	19.8546	0.9987	7
54	0.0506	0.0507	19.7403	0.9987	6
55	0.0509	0.0509	19.6273	0.9987	5
56	0.0512	0.0512	19.5156	0.9987	4
57	0.0515	0.0515	19.4051	0.9987	3
58	0.0518	0.0518	19.2959	0.9987	2
59	0.0520	0.0521	19.1879	0.9986	1
60	0.0523	0.0524	19.0811	0.9986	0
	Cos	Cot	Tan	Sin	′

′	Sin	Tan	Cot	Cos	
0	0.0523	0.0524	19.0811	0.9986	60
1	0.0526	0.0527	18.9755	0.9986	59
2	0.0529	0.0530	18.8711	0.9986	58
3	0.0532	0.0533	18.7678	0.9986	57
4	0.0535	0.0536	18.6656	0.9986	56
5	0.0538	0.0539	18.5645	0.9986	55
6	0.0541	0.0542	18.4645	0.9985	54
7	0.0544	0.0544	18.3655	0.9985	53
8	0.0547	0.0547	18.2677	0.9985	52
9	0.0550	0.0550	18.1708	0.9985	51
10	0.0552	0.0553	18.0750	0.9985	50
11	0.0555	0.0556	17.9802	0.9985	49
12	0.0558	0.0559	17.8863	0.9984	48
13	0.0561	0.0562	17.7934	0.9984	47
14	0.0564	0.0565	17.7015	0.9984	46
15	0.0567	0.0568	17.6106	0.9984	45
16	0.0570	0.0571	17.5205	0.9984	44
17	0.0573	0.0574	17.4314	0.9984	43
18	0.0576	0.0577	17.3432	0.9983	42
19	0.0579	0.0580	17.2558	0.9983	41
20	0.0581	0.0582	17.1693	0.9983	40
21	0.0584	0.0585	17.0837	0.9983	39
22	0.0587	0.0588	16.9990	0.9983	38
23	0.0590	0.0591	16.9150	0.9983	37
24	0.0593	0.0594	16.8319	0.9982	36
25	0.0596	0.0597	16.7496	0.9982	35
26	0.0599	0.0600	16.6681	0.9982	34
27	0.0602	0.0603	16.5874	0.9982	33
28	0.0605	0.0606	16.5075	0.9982	32
29	0.0608	0.0609	16.4283	0.9982	31
30	0.0610	0.0612	16.3499	0.9981	30
31	0.0613	0.0615	16.2722	0.9981	29
32	0.0616	0.0617	16.1952	0.9981	28
33	0.0619	0.0620	16.1190	0.9981	27
34	0.0622	0.0623	16.0435	0.9981	26
35	0.0625	0.0626	15.9687	0.9980	25
36	0.0628	0.0629	15.8945	0.9980	24
37	*0.0631	0.0632	15.8211	0.9980	23
38	0.0634	0.0635	15.7483	0.9980	22
39	0.0637	0.0638	15.6762	0.9980	21
40	0.0640	0.0641	15.6048	0.9980	20
41	0.0642	0.0644	15.5340	0.9979	19
42	0.0645	0.0647	15.4638	0.9979	18
43	0.0648	0.0650	15.3943	0.9979	17
44	0.0651	0.0653	15.3254	0.9979	16
45	0.0654	0.0655	15.2571	0.9979	15
46	0.0657	0.0658	15.1893	0.9978	14
47	0.0660	0.0661	15.1222	0.9978	13
48	0.0663	0.0664	15.0557	0.9978	12
49	0.0666	0.0667	14.9898	0.9978	11
50	0.0669	0.0670	14.9244	0.9978	10
51	0.0671	0.0673	14.8596	0.9977	9
52	0.0674	0.0676	14.7954	0.9977	8
53	0.0677	0.0679	14.7317	0.9977	7
54	0.0680	0.0682	14.6685	0.9977	6
55	0.0683	0.0685	14.6059	0.9977	5
56	0.0686	0.0688	14.5438	0.9976	4
57	0.0689	0.0690	14.4823	0.9976	3
58	0.0692	0.0693	14.4212	0.9976	2
59	0.0695	0.0696	14.3607	0.9976	1
60	0.0698	0.0699	14.3007	0.9976	0
	Cos	Cot	Tan	Sin	′

'	Sin	Tan	Cot	Cos	
	0.0698	0.0699	14.3007	0.9976	60
	0.0700	0.0702	14.2411	0.9975	59
	0.0703	0.0705	14.1821	0.9975	58
	0.0706	0.0708	14.1235	0.9975	57
	0.0709	0.0711	14.0655	0.9975	56
	0.0712	0.0714	14.0079	0.9975	55
	0.0715	0.0717	13.9507	0.9974	54
	0.0718	0.0720	13.8940	0.9974	53
	0.0721	0.0723	13.8378	0.9974	52
	0.0724	0.0726	13.7821	0.9974	51
	0.0727	0.0729	13.7267	0.9974	50
	0.0729	0.0731	13.6719	0.9973	49
	0.0732	0.0734	13.6174	0.9973	48
	0.0735	0.0737	13.5634	0.9973	47
	0.0738	0.0740	13.5098	0.9973	46
	0.0741	0.0743	13.4566	0.9973	45
	0.0744	0.0746	13.4039	0.9972	44
	0.0747	0.0749	13.3515	0.9972	43
	0.0750	0.0752	13.2996	0.9972	42
	0.0753	0.0755	13.2480	0.9972	41
	0.0756	0.0758	13.1969	0.9971	40
	0.0758	0.0761	13.1461	0.9971	39
	0.0761	0.0764	13.0958	0.9971	38
	0.0764	0.0767	13.0458	0.9971	37
	0.0767	0.0769	12.9962	0.9971	36
	0.0770	0.0772	12.9469	0.9970	35
	0.0773	0.0775	12.8981	0.9970	34
	0.0776	0.0778	12.8496	0.9970	33
	0.0779	0.0781	12.8014	0.9970	32
	0.0782	0.0784	12.7536	0.9969	31
	0.0785	0.0787	12.7062	0.9969	30
	0.0787	0.0790	12.6591	0.9969	29
	0.0790	0.0793	12.6124	0.9969	28
	0.0793	0.0796	12.5660	0.9968	27
	0.0796	0.0799	12.5199	0.9968	26
	0.0799	0.0802	12.4742	0.9968	25
	0.0802	0.0805	12.4288	0.9968	24
	0.0805	0.0808	12.3838	0.9968	23
	0.0808	0.0810	12.3390	0.9967	22
	0.0811	0.0813	12.2946	0.9967	21
	0.0814	0.0816	12.2505	0.9967	20
	0.0816	0.0819	12.2067	0.9967	19
	0.0819	0.0822	12.1632	0.9966	18
	0.0822	0.0825	12.1201	0.9966	17
	0.0825	0.0828	12.0772	0.9966	16
	0.0828	0.0831	12.0346	0.9966	15
	0.0831	0.0834	11.9923	0.9965	14
	0.0834	0.0837	11.9504	0.9965	13
	0.0837	0.0840	11.9087	0.9965	12
	0.0840	0.0843	11.8673	0.9965	11
	0.0843	0.0846	11.8262	0.9964	10
	0.0845	0.0849	11.7853	0.9964	9
	0.0848	0.0851	11.7448	0.9964	8
	0.0851	0.0854	11.7045	0.9964	7
	0.0854	0.0857	11.6645	0.9963	6
	0.0857	0.0860	11.6248	0.9963	5
	0.0860	0.0863	11.5853	0.9963	4
	0.0863	0.0866	11.5461	0.9963	3
	0.0866	0.0869	11.5072	0.9962	2
	0.0869	0.0872	11.4685	0.9962	1
	0.0872	0.0875	11.4301	0.9962	0
	Cos	Cot	Tan	Sin	'

'	Sin	Tan	Cot	Cos	
0	0.0872	0.0875	11.4301	0.9962	60
1	0.0874	0.0878	11.3919	0.9962	59
2	0.0877	0.0881	11.3540	0.9961	58
3	0.0880	0.0884	11.3163	0.9961	57
4	0.0883	0.0887	11.2789	0.9961	56
5	0.0886	0.0890	11.2417	0.9961	55
6	0.0889	0.0892	11.2048	0.9960	54
7	0.0892	0.0895	11.1681	0.9960	53
8	0.0895	0.0898	11.1316	0.9960	52
9	0.0898	0.0901	11.0954	0.9960	51
10	0.0901	0.0904	11.0594	0.9959	50
11	0.0903	0.0907	11.0237	0.9959	49
12	0.0906	0.0910	10.9882	0.9959	48
13	0.0909	0.0913	10.9529	0.9959	47
14	0.0912	0.0916	10.9178	0.9958	46
15	0.0915	0.0919	10.8829	0.9958	45
16	0.0918	0.0922	10.8483	0.9958	44
17	0.0921	0.0925	10.8139	0.9958	43
18	0.0924	0.0928	10.7797	0.9957	42
19	0.0927	0.0931	10.7457	0.9957	41
20	0.0929	0.0934	10.7119	0.9957	40
21	0.0932	0.0936	10.6783	0.9956	39
22	0.0935	0.0939	10.6450	0.9956	38
23	0.0938	0.0942	10.6118	0.9956	37
24	0.0941	0.0945	10.5789	0.9956	36
25	0.0944	0.0948	10.5462	0.9955	35
26	0.0947	0.0951	10.5136	0.9955	34
27	0.0950	0.0954	10.4813	0.9955	33
28	0.0953	0.0957	10.4491	0.9955	32
29	0.0956	0.0960	10.4172	0.9954	31
30	0.0958	0.0963	10.3854	0.9954	30
31	0.0961	0.0966	10.3538	0.9954	29
32	0.0964	0.0969	10.3224	0.9953	28
33	0.0967	0.0972	10.2913	0.9953	27
34	0.0970	0.0975	10.2602	0.9953	26
35	0.0973	0.0978	10.2294	0.9953	25
36	0.0976	0.0981	10.1988	0.9952	24
37	0.0979	0.0983	10.1683	0.9952	23
38	0.0982	0.0986	10.1381	0.9952	22
39	0.0985	0.0989	10.1080	0.9951	21
40	0.0987	0.0992	10.0780	0.9951	20
41	0.0990	0.0995	10.0483	0.9951	19
42	0.0993	0.0998	10.0187	0.9951	18
43	0.0996	0.1001	9.9893	0.9950	17
44	0.0999	0.1004	9.9601	0.9950	16
45	0.1002	0.1007	9.9310	0.9950	15
46	0.1005	0.1010	9.9021	0.9949	14
47	0.1008	0.1013	9.8734	0.9949	13
48	0.1011	0.1016	9.8448	0.9949	12
49	0.1013	0.1019	9.8164	0.9949	11
50	0.1016	0.1022	9.7882	0.9948	10
51	0.1019	0.1025	9.7601	0.9948	9
52	0.1022	0.1028	9.7322	0.9948	8
53	0.1025	0.1030	9.7044	0.9947	7
54	0.1028	0.1033	9.6768	0.9947	6
55	0.1031	0.1036	9.6493	0.9947	5
56	0.1034	0.1039	9.6220	0.9946	4
57	0.1037	0.1042	9.5949	0.9946	3
58	0.1039	0.1045	9.5679	0.9946	2
59	0.1042	0.1048	9.5411	0.9946	1
60	0.1045	0.1051	9.5144	0.9945	0
	Cos	Cot	Tan	Sin	'

'	Sin	Tan	Cot	Cos	
0	0.1045	0.1051	9.5144	0.9945	60
1	0.1048	0.1054	9.4878	0.9945	59
2	0.1051	0.1057	9.4614	0.9945	58
3	0.1054	0.1060	9.4352	0.9944	57
4	0.1057	0.1063	9.4090	0.9944	56
5	0.1060	0.1066	9.3831	0.9944	55
6	0.1063	0.1069	9.3572	0.9943	54
7	0.1066	0.1072	9.3315	0.9943	53
8	0.1068	0.1075	9.3060	0.9943	52
9	0.1071	0.1078	9.2806	0.9942	51
10	0.1074	0.1080	9.2553	0.9942	50
11	0.1077	0.1083	9.2302	0.9942	49
12	0.1080	0.1086	9.2052	0.9942	48
13	0.1083	0.1089	9.1803	0.9941	47
14	0.1086	0.1092	9.1555	0.9941	46
15	0.1089	0.1095	9.1309	0.9941	45
16	0.1092	0.1098	9.1065	0.9940	44
17	0.1094	0.1101	9.0821	0.9940	43
18	0.1097	0.1104	9.0579	0.9940	42
19	0.1100	0.1107	9.0338	0.9939	41
20	0.1103	0.1110	9.0098	0.9939	40
21	0.1106	0.1113	8.9860	0.9939	39
22	0.1109	0.1116	8.9623	0.9938	38
23	0.1112	0.1119	8.9387	0.9938	37
24	0.1115	0.1122	8.9152	0.9938	36
25	0.1118	0.1125	8.8919	0.9937	35
26	0.1120	0.1128	8.8686	0.9937	34
27	0.1123	0.1131	8.8455	0.9937	33
28	0.1126	0.1133	8.8225	0.9936	32
29	0.1129	0.1136	8.7996	0.9936	31
30	0.1132	0.1139	8.7769	0.9936	30
31	0.1135	0.1142	8.7542	0.9935	29
32	0.1138	0.1145	8.7317	0.9935	28
33	0.1141	0.1148	8.7093	0.9935	27
34	0.1144	0.1151	8.6870	0.9934	26
35	0.1146	0.1154	8.6648	0.9934	25
36	0.1149	0.1157	8.6427	0.9934	24
37	0.1152	0.1160	8.6208	0.9933	23
38	0.1155	0.1163	8.5989	0.9933	22
39	0.1158	0.1166	8.5772	0.9933	21
40	0.1161	0.1169	8.5555	0.9932	20
41	0.1164	0.1172	8.5340	0.9932	19
42	0.1167	0.1175	8.5126	0.9932	18
43	0.1170	0.1178	8.4913	0.9931	17
44	0.1172	0.1181	8.4701	0.9931	16
45	0.1175	0.1184	8.4490	0.9931	15
46	0.1178	0.1187	8.4280	0.9930	14
47	0.1181	0.1189	8.4071	0.9930	13
48	0.1184	0.1192	8.3863	0.9930	12
49	0.1187	0.1195	8.3656	0.9929	11
50	0.1190	0.1198	8.3450	0.9929	10
51	0.1193	0.1201	8.3245	0.9929	9
52	0.1196	0.1204	8.3041	0.9928	8
53	0.1198	0.1207	8.2838	0.9928	7
54	0.1201	0.1210	8.2636	0.9928	6
55	0.1204	0.1213	8.2434	0.9927	5
56	0.1207	0.1216	8.2234	0.9927	4
57	0.1210	0.1219	8.2035	0.9927	3
58	0.1213	0.1222	8.1837	0.9926	2
59	0.1216	0.1225	8.1640	0.9926	1
60	0.1219	0.1228	8.1443	0.9925	0
	Cos	Cot	Tan	Sin	'

'	Sin	Tan	Cot	Cos	
0	0.1219	0.1228	8.1443	0.9925	60
1	0.1222	0.1231	8.1248	0.9925	59
2	0.1224	0.1234	8.1054	0.9925	58
3	0.1227	0.1237	8.0860	0.9924	57
4	0.1230	0.1240	8.0667	0.9924	56
5	0.1233	0.1243	8.0476	0.9924	55
6	0.1236	0.1246	8.0285	0.9923	54
7	0.1239	0.1249	8.0095	0.9923	53
8	0.1242	0.1251	7.9906	0.9923	52
9	0.1245	0.1254	7.9718	0.9922	51
10	0.1248	0.1257	7.9530	0.9922	50
11	0.1250	0.1260	7.9344	0.9922	49
12	0.1253	0.1263	7.9158	0.9921	48
13	0.1256	0.1266	7.8973	0.9921	47
14	0.1259	0.1269	7.8789	0.9920	46
15	0.1262	0.1272	7.8606	0.9920	45
16	0.1265	0.1275	7.8424	0.9920	44
17	0.1268	0.1278	7.8243	0.9919	43
18	0.1271	0.1281	7.8062	0.9919	42
19	0.1274	0.1284	7.7882	0.9919	41
20	0.1276	0.1287	7.7704	0.9918	40
21	0.1279	0.1290	7.7525	0.9918	39
22	0.1282	0.1293	7.7348	0.9917	38
23	0.1285	0.1296	7.7171	0.9917	37
24	0.1288	0.1299	7.6996	0.9917	36
25	0.1291	0.1302	7.6821	0.9916	35
26	0.1294	0.1305	7.6647	0.9916	34
27	0.1297	0.1308	7.6473	0.9916	33
28	0.1299	0.1311	7.6301	0.9915	32
29	0.1302	0.1314	7.6129	0.9915	31
30	0.1305	0.1317	7.5958	0.9914	30
31	0.1308	0.1319	7.5787	0.9914	29
32	0.1311	0.1322	7.5618	0.9914	28
33	0.1314	0.1325	7.5449	0.9913	27
34	0.1317	0.1328	7.5281	0.9913	26
35	0.1320	0.1331	7.5113	0.9913	25
36	0.1323	0.1334	7.4947	0.9912	24
37	0.1325	0.1337	7.4781	0.9912	23
38	0.1328	0.1340	7.4615	0.9911	22
39	0.1331	0.1343	7.4451	0.9911	21
40	0.1334	0.1346	7.4287	0.9911	20
41	0.1337	0.1349	7.4124	0.9910	19
42	0.1340	0.1352	7.3962	0.9910	18
43	0.1343	0.1355	7.3800	0.9909	17
44	0.1346	0.1358	7.3639	0.9909	16
45	0.1349	0.1361	7.3479	0.9909	15
46	0.1351	0.1364	7.3319	0.9908	14
47	0.1354	0.1367	7.3160	0.9908	13
48	0.1357	0.1370	7.3002	0.9907	12
49	0.1360	0.1373	7.2844	0.9907	11
50	0.1363	0.1376	7.2687	0.9907	10
51	0.1366	0.1379	7.2531	0.9906	9
52	0.1369	0.1382	7.2375	0.9906	8
53	0.1372	0.1385	7.2220	0.9905	7
54	0.1374	0.1388	7.2066	0.9905	6
55	0.1377	0.1391	7.1912	0.9905	5
56	0.1380	0.1394	7.1759	0.9904	4
57	0.1383	0.1397	7.1607	0.9904	3
58	0.1386	0.1399	7.1455	0.9903	2
59	0.1389	0.1402	7.1304	0.9903	1
60	0.1392	0.1405	7.1154	0.9903	0
	Cos	Cot	Tan	Sin	'

'	Sin	Tan	Cot	Cos	
0	0.1392	0.1405	7.1154	0.9903	60
1	0.1395	0.1408	7.1004	0.9902	59
2	0.1397	0.1411	7.0855	0.9902	58
3	0.1400	0.1414	7.0706	0.9901	57
4	0.1403	0.1417	7.0558	0.9901	56
5	0.1406	0.1420	7.0410	0.9901	55
6	0.1409	0.1423	7.0264	0.9900	54
7	0.1412	0.1426	7.0117	0.9900	53
8	0.1415	0.1429	6.9972	0.9899	52
9	0.1418	0.1432	6.9827	0.9899	51
10	0.1421	0.1435	6.9682	0.9899	50
11	0.1423	0.1438	6.9538	0.9898	49
12	0.1426	0.1441	6.9395	0.9898	48
13	0.1429	0.1444	6.9252	0.9897	47
14	0.1432	0.1447	6.9110	0.9897	46
15	0.1435	0.1450	6.8969	0.9897	45
16	0.1438	0.1453	6.8828	0.9896	44
17	0.1441	0.1456	6.8687	0.9896	43
18	0.1444	0.1459	6.8548	0.9895	42
19	0.1446	0.1462	6.8408	0.9895	41
20	0.1449	0.1465	6.8269	0.9894	40
21	0.1452	0.1468	6.8131	0.9894	39
22	0.1455	0.1471	6.7994	0.9894	38
23	0.1458	0.1474	6.7856	0.9893	37
24	0.1461	0.1477	6.7720	0.9893	36
25	0.1464	0.1480	6.7584	0.9892	35
26	0.1467	0.1483	6.7448	0.9892	34
27	0.1469	0.1486	6.7313	0.9891	33
28	0.1472	0.1489	6.7179	0.9891	32
29	0.1475	0.1492	6.7045	0.9891	31
30	0.1478	0.1495	6.6912	0.9890	30
31	0.1481	0.1497	6.6779	0.9890	29
32	0.1484	0.1500	6.6646	0.9889	28
33	0.1487	0.1503	6.6514	0.9889	27
34	0.1490	0.1506	6.6383	0.9888	26
35	0.1492	0.1509	6.6252	0.9888	25
36	0.1495	0.1512	6.6122	0.9888	24
37	0.1498	0.1515	6.5992	0.9887	23
38	0.1501	0.1518	6.5863	0.9887	22
39	0.1504	0.1521	6.5734	0.9886	21
40	0.1507	0.1524	6.5606	0.9886	20
41	0.1510	0.1527	6.5478	0.9885	19
42	0.1513	0.1530	6.5350	0.9885	18
43	0.1515	0.1533	6.5223	0.9884	17
44	0.1518	0.1536	6.5097	0.9884	16
45	0.1521	0.1539	6.4971	0.9884	15
46	0.1524	0.1542	6.4846	0.9883	14
47	0.1527	0.1545	6.4721	0.9883	13
48	0.1530	0.1548	6.4596	0.9882	12
49	0.1533	0.1551	6.4472	0.9882	11
50	0.1536	0.1554	6.4348	0.9881	10
51	0.1538	0.1557	6.4225	0.9881	9
52	0.1541	0.1560	6.4103	0.9880	8
53	0.1544	0.1563	6.3980	0.9880	7
54	0.1547	0.1566	6.3859	0.9880	6
55	0.1550	0.1569	6.3737	0.9879	5
56	0.1553	0.1572	6.3617	0.9879	4
57	0.1556	0.1575	6.3496	0.9878	3
58	0.1559	0.1578	6.3376	0.9878	2
59	0.1561	0.1581	6.3257	0.9877	1
60	0.1564	0.1584	6.3138	0.9877	0
	Cos	Cot	Tan	Sin	'

	Sin	Tan	Cot	Cos	
0	0.1564	0.1584	6.3138	0.9877	60
1	0.1567	0.1587	6.3019	0.9876	59
2	0.1570	0.1590	6.2901	0.9876	58
3	0.1573	0.1593	6.2783	0.9876	57
4	0.1576	0.1596	6.2666	0.9875	56
5	0.1579	0.1599	6.2549	0.9875	55
6	0.1582	0.1602	6.2432	0.9874	54
7	0.1584	0.1605	6.2316	0.9874	53
8	0.1587	0.1608	6.2200	0.9873	52
9	0.1590	0.1611	6.2085	0.9873	51
10	0.1593	0.1614	6.1970	0.9872	50
11	0.1596	0.1617	6.1856	0.9872	49
12	0.1599	0.1620	6.1742	0.9871	48
13	0.1602	0.1623	6.1628	0.9871	47
14	0.1605	0.1626	6.1515	0.9870	46
15	0.1607	0.1629	6.1402	0.9870	45
16	0.1610	0.1632	6.1290	0.9869	44
17	0.1613	0.1635	6.1178	0.9869	43
18	0.1616	0.1638	6.1066	0.9869	42
19	0.1619	0.1641	6.0955	0.9868	41
20	0.1622	0.1644	6.0844	0.9868	40
21	0.1625	0.1647	6.0734	0.9867	39
22	0.1628	0.1650	6.0624	0.9867	38
23	0.1630	0.1653	6.0514	0.9866	37
24	0.1633	0.1655	6.0405	0.9866	36
25	0.1636	0.1658	6.0296	0.9865	35
26	0.1639	0.1661	6.0188	0.9865	34
27	0.1642	0.1664	6.0080	0.9864	33
28	0.1645	0.1667	5.9972	0.9864	32
29	0.1648	0.1670	5.9865	0.9863	31
30	0.1650	0.1673	5.9758	0.9863	30
31	0.1653	0.1676	5.9651	0.9862	29
32	0.1656	0.1679	5.9545	0.9862	28
33	0.1659	0.1682	5.9439	0.9861	27
34	0.1662	0.1685	5.9333	0.9861	26
35	0.1665	0.1688	5.9228	0.9860	25
36	0.1668	0.1691	5.9124	0.9860	24
37	0.1671	0.1694	5.9019	0.9859	23
38	0.1673	0.1697	5.8915	0.9859	22
39	0.1676	0.1700	5.8811	0.9859	21
40	0.1679	0.1703	5.8708	0.9858	20
41	0.1682	0.1706	5.8605	0.9858	19
42	0.1685	0.1709	5.8502	0.9857	18
43	0.1688	0.1712	5.8400	0.9857	17
44	0.1691	0.1715	5.8298	0.9856	16
45	0.1693	0.1718	5.8197	0.9856	15
46	0.1696	0.1721	5.8095	0.9855	14
47	0.1699	0.1724	5.7994	0.9855	13
48	0.1702	0.1727	5.7894	0.9854	12
49	0.1705	0.1730	5.7794	0.9854	11
50	0.1708	0.1733	5.7694	0.9853	10
51	0.1711	0.1736	5.7594	0.9853	9
52	0.1714	0.1739	5.7495	0.9852	8
53	0.1716	0.1742	5.7396	0.9852	7
54	0.1719	0.1745	5.7297	0.9851	6
55	0.1722	0.1748	5.7199	0.9851	5
56	0.1725	0.1751	5.7101	0.9850	4
57	0.1728	0.1754	5.7004	0.9850	3
58	0.1731	0.1757	5.6906	0.9849	2
59	0.1734	0.1760	5.6809	0.9849	1
60	0.1736	0.1763	5.6713	0.9848	0
	Cos	Cot	Tan	Sin	'

′	Sin	Tan	Cot	Cos	
0	0.1736	0.1763	5.6713	0.9848	60
1	0.1739	0.1766	5.6617	0.9848	59
2	0.1742	0.1769	5.6521	0.9847	58
3	0.1745	0.1772	5.6425	0.9847	57
4	0.1748	0.1775	5.6329	0.9846	56
5	0.1751	0.1778	5.6234	0.9846	55
6	0.1754	0.1781	5.6140	0.9845	54
7	0.1757	0.1784	5.6045	0.9845	53
8	0.1759	0.1787	5.5951	0.9844	52
9	0.1762	0.1790	5.5857	0.9843	51
10	0.1765	0.1793	5.5764	0.9843	50
11	0.1768	0.1796	5.5671	0.9842	49
12	0.1771	0.1799	5.5578	0.9842	48
13	0.1774	0.1802	5.5485	0.9841	47
14	0.1777	0.1805	5.5393	0.9841	46
15	0.1779	0.1808	5.5301	0.9840	45
16	0.1782	0.1811	5.5209	0.9840	44
17	0.1785	0.1814	5.5118	0.9839	43
18	0.1788	0.1817	5.5026	0.9839	42
19	0.1791	0.1820	5.4936	0.9838	41
20	0.1794	0.1823	5.4845	0.9838	40
21	0.1797	0.1826	5.4755	0.9837	39
22	0.1799	0.1829	5.4665	0.9837	38
23	0.1802	0.1832	5.4575	0.9836	37
24	0.1805	0.1835	5.4486	0.9836	36
25	0.1808	0.1838	5.4397	0.9835	35
26	0.1811	0.1841	5.4308	0.9835	34
27	0.1814	0.1844	5.4219	0.9834	33
28	0.1817	0.1847	5.4131	0.9834	32
29	0.1819	0.1850	5.4043	0.9833	31
30	0.1822	0.1853	5.3955	0.9833	30
31	0.1825	0.1856	5.3868	0.9832	29
32	0.1828	0.1859	5.3781	0.9831	28
33	0.1831	0.1862	5.3694	0.9831	27
34	0.1834	0.1865	5.3607	0.9830	26
35	0.1837	0.1868	5.3521	0.9830	25
36	0.1840	0.1871	5.3435	0.9829	24
37	0.1842	0.1874	5.3349	0.9829	23
38	0.1845	0.1877	5.3263	0.9828	22
39	0.1848	0.1880	5.3178	0.9828	21
40	0.1851	0.1883	5.3093	0.9827	20
41	0.1854	0.1887	5.3008	0.9827	19
42	0.1857	0.1890	5.2924	0.9826	18
43	0.1860	0.1893	5.2839	0.9826	17
44	0.1862	0.1896	5.2755	0.9825	16
45	0.1865	0.1899	5.2672	0.9825	15
46	0.1868	0.1902	5.2588	0.9824	14
47	0.1871	0.1905	5.2505	0.9823	13
48	0.1874	0.1908	5.2422	0.9823	12
49	0.1877	0.1911	5.2339	0.9822	11
50	0.1880	0.1914	5.2257	0.9822	10
51	0.1882	0.1917	5.2174	0.9821	9
52	0.1885	0.1920	5.2092	0.9821	8
53	0.1888	0.1923	5.2011	0.9820	7
54	0.1891	0.1926	5.1929	0.9820	6
55	0.1894	0.1929	5.1848	0.9819	5
56	0.1897	0.1932	5.1767	0.9818	4
57	0.1900	0.1935	5.1686	0.9818	3
58	0.1902	0.1938	5.1606	0.9817	2
59	0.1905	0.1941	5.1526	0.9817	1
60	0.1908	0.1944	5.1446	0.9816	0
	Cos	Cot	Tan	Sin	′

′	Sin	Tan	Cot	Cos	
0	0.1908	0.1944	5.1446	0.9816	60
1	0.1911	0.1947	5.1366	0.9816	59
2	0.1914	0.1950	5.1286	0.9815	58
3	0.1917	0.1953	5.1207	0.9815	57
4	0.1920	0.1956	5.1128	0.9814	56
5	0.1922	0.1959	5.1049	0.9813	55
6	0.1925	0.1962	5.0970	0.9813	54
7	0.1928	0.1965	5.0892	0.9812	53
8	0.1931	0.1968	5.0814	0.9812	52
9	0.1934	0.1971	5.0736	0.9811	51
10	0.1937	0.1974	5.0658	0.9811	50
11	0.1939	0.1977	5.0581	0.9810	49
12	0.1942	0.1980	5.0504	0.9810	48
13	0.1945	0.1983	5.0427	0.9809	47
14	0.1948	0.1986	5.0350	0.9808	46
15	0.1951	0.1989	5.0273	0.9808	45
16	0.1954	0.1992	5.0197	0.9807	44
17	0.1957	0.1995	5.0121	0.9807	43
18	0.1959	0.1998	5.0045	0.9806	42
19	0.1962	0.2001	4.9969	0.9806	41
20	0.1965	0.2004	4.9894	0.9805	40
21	0.1968	0.2007	4.9819	0.9804	39
22	0.1971	0.2010	4.9744	0.9804	38
23	0.1974	0.2013	4.9669	0.9803	37
24	0.1977	0.2016	4.9594	0.9803	36
25	0.1979	0.2019	4.9520	0.9802	35
26	0.1982	0.2022	4.9446	0.9802	34
27	0.1985	0.2025	4.9372	0.9801	33
28	0.1988	0.2028	4.9298	0.9800	32
29	0.1991	0.2031	4.9225	0.9800	31
30	0.1994	0.2035	4.9152	0.9799	30
31	0.1997	0.2038	4.9078	0.9799	29
32	0.1999	0.2041	4.9006	0.9798	28
33	0.2002	0.2044	4.8933	0.9798	27
34	0.2005	0.2047	4.8860	0.9797	26
35	0.2008	0.2050	4.8788	0.9796	25
36	0.2011	0.2053	4.8716	0.9796	24
37	0.2014	0.2056	4.8644	0.9795	23
38	0.2016	0.2059	4.8573	0.9795	22
39	0.2019	0.2062	4.8501	0.9794	21
40	0.2022	0.2065	4.8430	0.9793	20
41	0.2025	0.2068	4.8359	0.9793	19
42	0.2028	0.2071	4.8288	0.9792	18
43	0.2031	0.2074	4.8218	0.9792	17
44	0.2034	0.2077	4.8147	0.9791	16
45	0.2036	0.2080	4.8077	0.9790	15
46	0.2039	0.2083	4.8007	0.9790	14
47	0.2042	0.2086	4.7937	0.9789	13
48	0.2045	0.2089	4.7867	0.9789	12
49	0.2048	0.2092	4.7798	0.9788	11
50	0.2051	0.2095	4.7729	0.9787	10
51	0.2054	0.2098	4.7659	0.9787	9
52	0.2056	0.2101	4.7591	0.9786	8
53	0.2059	0.2104	4.7522	0.9786	7
54	0.2062	0.2107	4.7453	0.9785	6
55	0.2065	0.2110	4.7385	0.9784	5
56	0.2068	0.2113	4.7317	0.9784	4
57	0.2071	0.2116	4.7249	0.9783	3
58	0.2073	0.2119	4.7181	0.9783	2
59	0.2076	0.2123	4.7114	0.9782	1
60	0.2079	0.2126	4.7046	0.9781	0
	Cos	Cot	Tan	Sin	′

'	Sin	Tan	Cot	Cos	
0	0.2079	0.2126	4.7046	0.9781	60
1	0.2082	0.2129	4.6979	0.9781	59
2	0.2085	0.2132	4.6912	0.9780	58
3	0.2088	0.2135	4.6845	0.9780	57
4	0.2090	0.2138	4.6779	0.9779	56
5	0.2093	0.2141	4.6712	0.9778	55
6	0.2096	0.2144	4.6646	0.9778	54
7	0.2099	0.2147	4.6580	0.9777	53
8	0.2102	0.2150	4.6514	0.9777	52
9	0.2105	0.2153	4.6448	0.9776	51
10	0.2108	0.2156	4.6382	0.9775	50
11	0.2110	0.2159	4.6317	0.9775	49
12	0.2113	0.2162	4.6252	0.9774	48
13	0.2116	0.2165	4.6187	0.9774	47
14	0.2119	0.2168	4.6122	0.9773	46
15	0.2122	0.2171	4.6057	0.9772	45
16	0.2125	0.2174	4.5993	0.9772	44
17	0.2127	0.2177	4.5928	0.9771	43
18	0.2130	0.2180	4.5864	0.9770	42
19	0.2133	0.2183	4.5800	0.9770	41
20	0.2136	0.2186	4.5736	0.9769	40
21	0.2139	0.2189	4.5673	0.9769	39
22	0.2142	0.2193	4.5609	0.9768	38
23	0.2145	0.2196	4.5546	0.9767	37
24	0.2147	0.2199	4.5483	0.9767	36
25	0.2150	0.2202	4.5420	0.9766	35
26	0.2153	0.2205	4.5357	0.9765	34
27	0.2156	0.2208	4.5294	0.9765	33
28	0.2159	0.2211	4.5232	0.9764	32
29	0.2162	0.2214	4.5169	0.9764	31
30	0.2164	0.2217	4.5107	0.9763	30
31	0.2167	0.2220	4.5045	0.9762	29
32	0.2170	0.2223	4.4983	0.9762	28
33	0.2173	0.2226	4.4922	0.9761	27
34	0.2176	0.2229	4.4860	0.9760	26
35	0.2179	0.2232	4.4799	0.9760	25
36	0.2181	0.2235	4.4737	0.9759	24
37	0.2184	0.2238	4.4676	0.9759	23
38	0.2187	0.2241	4.4615	0.9758	22
39	0.2190	0.2244	4.4555	0.9757	21
40	0.2193	0.2247	4.4494	0.9757	20
41	0.2196	0.2251	4.4434	0.9756	19
42	0.2198	0.2254	4.4373	0.9755	18
43	0.2201	0.2257	4.4313	0.9755	17
44	0.2204	0.2260	4.4253	0.9754	16
45	0.2207	0.2263	4.4194	0.9753	15
46	0.2210	0.2266	4.4134	0.9753	14
47	0.2213	0.2269	4.4075	0.9752	13
48	0.2215	0.2272	4.4015	0.9751	12
49	0.2218	0.2275	4.3956	0.9751	11
50	0.2221	0.2278	4.3897	0.9750	10
51	0.2224	0.2281	4.3838	0.9750	9
52	0.2227	0.2284	4.3779	0.9749	8
53	0.2230	0.2287	4.3721	0.9748	7
54	0.2233	0.2290	4.3662	0.9748	6
55	0.2235	0.2293	4.3604	0.9747	5
56	0.2238	0.2296	4.3546	0.9746	4
57	0.2241	0.2299	4.3488	0.9746	3
58	0.2244	0.2303	4.3430	0.9745	2
59	0.2247	0.2306	4.3372	0.9744	1
60	0.2250	0.2309	4.3315	0.9744	0
	Cos	Cot	Tan	Sin	'

'	Sin	Tan	Cot	Cos	
0	0.2250	0.2309	4.3315	0.9744	60
1	0.2252	0.2312	4.3257	0.9743	59
2	0.2255	0.2315	4.3200	0.9742	58
3	0.2258	0.2318	4.3143	0.9742	57
4	0.2261	0.2321	4.3086	0.9741	56
5	0.2264	0.2324	4.3029	0.9740	55
6	0.2267	0.2327	4.2972	0.9740	54
7	0.2269	0.2330	4.2916	0.9739	53
8	0.2272	0.2333	4.2859	0.9738	52
9	0.2275	0.2336	4.2803	0.9738	51
10	0.2278	0.2339	4.2747	0.9737	50
11	0.2281	0.2342	4.2691	0.9736	49
12	0.2284	0.2345	4.2635	0.9736	48
13	0.2286	0.2349	4.2580	0.9735	47
14	0.2289	0.2352	4.2524	0.9734	46
15	0.2292	0.2355	4.2468	0.9734	45
16	0.2295	0.2358	4.2413	0.9733	44
17	0.2298	0.2361	4.2358	0.9732	43
18	0.2300	0.2364	4.2303	0.9732	42
19	0.2303	0.2367	4.2248	0.9731	41
20	0.2306	0.2370	4.2193	0.9730	40
21	0.2309	0.2373	4.2139	0.9730	39
22	0.2312	0.2376	4.2084	0.9729	38
23	0.2315	0.2379	4.2030	0.9728	37
24	0.2317	0.2382	4.1976	0.9728	36
25	0.2320	0.2385	4.1922	0.9727	35
26	0.2323	0.2388	4.1868	0.9726	34
27	0.2326	0.2392	4.1814	0.9726	33
28	0.2329	0.2395	4.1760	0.9725	32
29	0.2332	0.2398	4.1706	0.9724	31
30	0.2334	0.2401	4.1653	0.9724	30
31	0.2337	0.2404	4.1600	0.9723	29
32	0.2340	0.2407	4.1547	0.9722	28
33	0.2343	0.2410	4.1493	0.9722	27
34	0.2346	0.2413	4.1441	0.9721	26
35	0.2349	0.2416	4.1388	0.9720	25
36	0.2351	0.2419	4.1335	0.9720	24
37	0.2354	0.2422	4.1282	0.9719	23
38	0.2357	0.2425	4.1230	0.9718	22
39	0.2360	0.2428	4.1178	0.9718	21
40	0.2363	0.2432	4.1126	0.9717	20
41	0.2366	0.2435	4.1074	0.9716	19
42	0.2368	0.2438	4.1022	0.9715	18
43	0.2371	0.2441	4.0970	0.9715	17
44	0.2374	0.2444	4.0918	0.9714	16
45	0.2377	0.2447	4.0867	0.9713	15
46	0.2380	0.2450	4.0815	0.9713	14
47	0.2383	0.2453	4.0764	0.9712	13
48	0.2385	0.2456	4.0713	0.9711	12
49	0.2388	0.2459	4.0662	0.9711	11
50	0.2391	0.2462	4.0611	0.9710	10
51	0.2394	0.2465	4.0560	0.9709	9
52	0.2397	0.2469	4.0509	0.9709	8
53	0.2399	0.2472	4.0459	0.9708	7
54	0.2402	0.2475	4.0408	0.9707	6
55	0.2405	0.2478	4.0358	0.9706	5
56	0.2408	0.2481	4.0308	0.9706	4
57	0.2411	0.2484	4.0257	0.9705	3
58	0.2414	0.2487	4.0207	0.9704	2
59	0.2416	0.2490	4.0158	0.9704	1
60	0.2419	0.2493	4.0108	0.9703	0
	Cos	Cot	Tan	Sin	'

'	Sin	Tan	Cot	Cos	
0	0.2419	0.2493	4.0108	0.9703	60
1	0.2422	0.2496	4.0058	0.9702	59
2	0.2425	0.2499	4.0009	0.9702	58
3	0.2428	0.2503	3.9959	0.9701	57
4	0.2431	0.2506	3.9910	0.9700	56
5	0.2433	0.2509	3.9861	0.9699	55
6	0.2436	0.2512	3.9812	0.9699	54
7	0.2439	0.2515	3.9763	0.9698	53
8	0.2442	0.2518	3.9714	0.9697	52
9	0.2445	0.2521	3.9665	0.9697	51
10	0.2447	0.2524	3.9617	0.9696	50
11	0.2450	0.2527	3.9568	0.9695	49
12	0.2453	0.2530	3.9520	0.9694	48
13	0.2456	0.2533	3.9471	0.9694	47
14	0.2459	0.2537	3.9423	0.9693	46
15	0.2462	0.2540	3.9375	0.9692	45
16	0.2464	0.2543	3.9327	0.9692	44
17	0.2467	0.2546	3.9279	0.9691	43
18	0.2470	0.2549	3.9232	0.9690	42
19	0.2473	0.2552	3.9184	0.9689	41
20	0.2476	0.2555	3.9136	0.9689	40
21	0.2478	0.2558	3.9089	0.9688	39
22	0.2481	0.2561	3.9042	0.9687	38
23	0.2484	0.2564	3.8995	0.9687	37
24	0.2487	0.2568	3.8947	0.9686	36
25	0.2490	0.2571	3.8900	0.9685	35
26	0.2493	0.2574	3.8854	0.9684	34
27	0.2495	0.2577	3.8807	0.9684	33
28	0.2498	0.2580	3.8760	0.9683	32
29	0.2501	0.2583	3.8714	0.9682	31
30	0.2504	0.2586	3.8667	0.9681	30
31	0.2507	0.2589	3.8621	0.9681	29
32	0.2509	0.2592	3.8575	0.9680	28
33	0.2512	0.2595	3.8528	0.9679	27
34	0.2515	0.2599	3.8482	0.9679	26
35	0.2518	0.2602	3.8436	0.9678	25
36	0.2521	0.2605	3.8391	0.9677	24
37	0.2524	0.2608	3.8345	0.9676	23
38	0.2526	0.2611	3.8299	0.9676	22
39	0.2529	0.2614	3.8254	0.9675	21
40	0.2532	0.2617	3.8208	0.9674	20
41	0.2535	0.2620	3.8163	0.9673	19
42	0.2538	0.2623	3.8118	0.9673	18
43	0.2540	0.2627	3.8073	0.9672	17
44	0.2543	0.2630	3.8028	0.9671	16
45	0.2546	0.2633	3.7983	0.9670	15
46	0.2549	0.2636	3.7938	0.9670	14
47	0.2552	0.2639	3.7893	0.9669	13
48	0.2554	0.2642	3.7848	0.9668	12
49	0.2557	0.2645	3.7804	0.9667	11
50	0.2560	0.2648	3.7760	0.9667	10
51	0.2563	0.2651	3.7715	0.9666	9
52	0.2566	0.2655	3.7671	0.9665	8
53	0.2569	0.2658	3.7627	0.9665	7
54	0.2571	0.2661	3.7583	0.9664	6
55	0.2574	0.2664	3.7539	0.9663	5
56	0.2577	0.2667	3.7495	0.9662	4
57	0.2580	0.2670	3.7451	0.9662	3
58	0.2583	0.2673	3.7408	0.9661	2
59	0.2585	0.2676	3.7364	0.9660	1
60	0.2588	0.2679	3.7321	0.9659	0
	Cos	Cot	Tan	Sin	'

'	Sin	Tan	Cot	Cos	
0	0.2588	0.2679	3.7321	0.9659	60
1	0.2591	0.2683	3.7277	0.9659	59
2	0.2594	0.2686	3.7234	0.9658	58
3	0.2597	0.2689	3.7191	0.9657	57
4	0.2599	0.2692	3.7148	0.9656	56
5	0.2602	0.2695	3.7105	0.9655	55
6	0.2605	0.2698	3.7062	0.9655	54
7	0.2608	0.2701	3.7019	0.9654	53
8	0.2611	0.2704	3.6976	0.9653	52
9	0.2613	0.2708	3.6933	0.9652	51
10	0.2616	0.2711	3.6891	0.9652	50
11	0.2619	0.2714	3.6848	0.9651	49
12	0.2622	0.2717	3.6806	0.9650	48
13	0.2625	0.2720	3.6764	0.9649	47
14	0.2628	0.2723	3.6722	0.9649	46
15	0.2630	0.2726	3.6680	0.9648	45
16	0.2633	0.2729	3.6638	0.9647	44
17	0.2636	0.2733	3.6596	0.9646	43
18	0.2639	0.2736	3.6554	0.9646	42
19	0.2642	0.2739	3.6512	0.9645	41
20	0.2644	0.2742	3.6470	0.9644	40
21	0.2647	0.2745	3.6429	0.9643	39
22	0.2650	0.2748	3.6387	0.9642	38
23	0.2653	0.2751	3.6346	0.9642	37
24	0.2656	0.2754	3.6305	0.9641	36
25	0.2658	0.2758	3.6264	0.9640	35
26	0.2661	0.2761	3.6222	0.9639	34
27	0.2664	0.2764	3.6181	0.9639	33
28	0.2667	0.2767	3.6140	0.9638	32
29	0.2670	0.2770	3.6100	0.9637	31
30	0.2672	0.2773	3.6059	0.9636	30
31	0.2675	0.2776	3.6018	0.9636	29
32	0.2678	0.2780	3.5978	0.9635	28
33	0.2681	0.2783	3.5937	0.9634	27
34	0.2684	0.2786	3.5897	0.9633	26
35	0.2686	0.2789	3.5856	0.9632	25
36	0.2689	0.2792	3.5816	0.9632	24
37	0.2692	0.2795	3.5776	0.9631	23
38	0.2695	0.2798	3.5736	0.9630	22
39	0.2698	0.2801	3.5696	0.9629	21
40	0.2700	0.2805	3.5656	0.9628	20
41	0.2703	0.2808	3.5616	0.9628	19
42	0.2706	0.2811	3.5576	0.9627	18
43	0.2709	0.2814	3.5536	0.9626	17
44	0.2712	0.2817	3.5497	0.9625	16
45	0.2714	0.2820	3.5457	0.9625	15
46	0.2717	0.2823	3.5418	0.9624	14
47	0.2720	0.2827	3.5379	0.9623	13
48	0.2723	0.2830	3.5339	0.9622	12
49	0.2726	0.2833	3.5300	0.9621	11
50	0.2728	0.2836	3.5261	0.9621	10
51	0.2731	0.2839	3.5222	0.9620	9
52	0.2734	0.2842	3.5183	0.9619	8
53	0.2737	0.2845	3.5144	0.9618	7
54	0.2740	0.2849	3.5105	0.9617	6
55	0.2742	0.2852	3.5067	0.9617	5
56	0.2745	0.2855	3.5028	0.9616	4
57	0.2748	0.2858	3.4989	0.9615	3
58	0.2751	0.2861	3.4951	0.9614	2
59	0.2754	0.2864	3.4912	0.9613	1
60	0.2756	0.2867	3.4874	0.9613	0
	Cos	Cot	Tan	Sin	'

′	Sin	Tan	Cot	Cos	
0	0.2756	0.2867	3.4874	0.9613	60
1	0.2759	0.2871	3.4836	0.9612	59
2	0.2762	0.2874	3.4798	0.9611	58
3	0.2765	0.2877	3.4760	0.9610	57
4	0.2768	0.2880	3.4722	0.9609	56
5	0.2770	0.2883	3.4684	0.9609	55
6	0.2773	0.2886	3.4646	0.9608	54
7	0.2776	0.2890	3.4608	0.9607	53
8	0.2779	0.2893	3.4570	0.9606	52
9	0.2782	0.2896	3.4533	0.9605	51
10	0.2784	0.2899	3.4495	0.9605	50
11	0.2787	0.2902	3.4458	0.9604	49
12	0.2790	0.2905	3.4420	0.9603	48
13	0.2793	0.2908	3.4383	0.9602	47
14	0.2795	0.2912	3.4346	0.9601	46
15	0.2798	0.2915	3.4308	0.9600	45
16	0.2801	0.2918	3.4271	0.9600	44
17	0.2804	0.2921	3.4234	0.9599	43
18	0.2807	0.2924	3.4197	0.9598	42
19	0.2809	0.2927	3.4160	0.9597	41
20	0.2812	0.2931	3.4124	0.9596	40
21	0.2815	0.2934	3.4087	0.9596	39
22	0.2818	0.2937	3.4050	0.9595	38
23	0.2821	0.2940	3.4014	0.9594	37
24	0.2823	0.2943	3.3977	0.9593	36
25	0.2826	0.2946	3.3941	0.9592	35
26	0.2829	0.2949	3.3904	0.9591	34
27	0.2832	0.2953	3.3868	0.9591	33
28	0.2835	0.2956	3.3832	0.9590	32
29	0.2837	0.2959	3.3796	0.9589	31
30	0.2840	0.2962	3.3759	0.9588	30
31	0.2843	0.2965	3.3723	0.9587	29
32	0.2846	0.2968	3.3687	0.9587	28
33	0.2849	0.2972	3.3652	0.9586	27
34	0.2851	0.2975	3.3616	0.9585	26
35	0.2854	0.2978	3.3580	0.9584	25
36	0.2857	0.2981	3.3544	0.9583	24
37	0.2860	0.2984	3.3509	0.9582	23
38	0.2862	0.2987	3.3473	0.9582	22
39	0.2865	0.2991	3.3438	0.9581	21
40	0.2868	0.2994	3.3402	0.9580	20
41	0.2871	0.2997	3.3367	0.9579	19
42	0.2874	0.3000	3.3332	0.9578	18
43	0.2876	0.3003	3.3297	0.9577	17
44	0.2879	0.3006	3.3261	0.9577	16
45	0.2882	0.3010	3.3226	0.9576	15
46	0.2885	0.3013	3.3191	0.9575	14
47	0.2888	0.3016	3.3156	0.9574	13
48	0.2890	0.3019	3.3122	0.9573	12
49	0.2893	0.3022	3.3087	0.9572	11
50	0.2896	0.3026	3.3052	0.9572	10
51	0.2899	0.3029	3.3017	0.9571	9
52	0.2901	0.3032	3.2983	0.9570	8
53	0.2904	0.3035	3.2948	0.9569	7
54	0.2907	0.3038	3.2914	0.9568	6
55	0.2910	0.3041	3.2879	0.9567	5
56	0.2913	0.3045	3.2845	0.9566	4
57	0.2915	0.3048	3.2811	0.9566	3
58	0.2918	0.3051	3.2777	0.9565	2
59	0.2921	0.3054	3.2743	0.9564	1
60	0.2924	0.3057	3.2709	0.9563	0
	Cos	Cot	Tan	Sin	′

′	Sin	Tan	Cot	Cos	
0	0.2924	0.3057	3.2709	0.9563	60
1	0.2926	0.3060	3.2675	0.9562	59
2	0.2929	0.3064	3.2641	0.9561	58
3	0.2932	0.3067	3.2607	0.9560	57
4	0.2935	0.3070	3.2573	0.9560	56
5	0.2938	0.3073	3.2539	0.9559	55
6	0.2940	0.3076	3.2506	0.9558	54
7	0.2943	0.3080	3.2472	0.9557	53
8	0.2946	0.3083	3.2438	0.9556	52
9	0.2949	0.3086	3.2405	0.9555	51
10	0.2952	0.3089	3.2371	0.9555	50
11	0.2954	0.3092	3.2338	0.9554	49
12	0.2957	0.3096	3.2305	0.9553	48
13	0.2960	0.3099	3.2272	0.9552	47
14	0.2963	0.3102	3.2238	0.9551	46
15	0.2965	0.3105	3.2205	0.9550	45
16	0.2968	0.3108	3.2172	0.9549	44
17	0.2971	0.3111	3.2139	0.9548	43
18	0.2974	0.3115	3.2106	0.9548	42
19	0.2977	0.3118	3.2073	0.9547	41
20	0.2979	0.3121	3.2041	0.9546	40
21	0.2982	0.3124	3.2008	0.9545	39
22	0.2985	0.3127	3.1975	0.9544	38
23	0.2988	0.3131	3.1943	0.9543	37
24	0.2990	0.3134	3.1910	0.9542	36
25	0.2993	0.3137	3.1878	0.9542	35
26	0.2996	0.3140	3.1845	0.9541	34
27	0.2999	0.3143	3.1813	0.9540	33
28	0.3002	0.3147	3.1780	0.9539	32
29	0.3004	0.3150	3.1748	0.9538	31
30	0.3007	0.3153	3.1716	0.9537	30
31	0.3010	0.3156	3.1684	0.9536	29
32	0.3013	0.3159	3.1652	0.9535	28
33	0.3015	0.3163	3.1620	0.9535	27
34	0.3018	0.3166	3.1588	0.9534	26
35	0.3021	0.3169	3.1556	0.9533	25
36	0.3024	0.3172	3.1524	0.9532	24
37	0.3026	0.3175	3.1492	0.9531	23
38	0.3029	0.3179	3.1460	0.9530	22
39	0.3032	0.3182	3.1429	0.9529	21
40	0.3035	0.3185	3.1397	0.9528	20
41	0.3038	0.3188	3.1366	0.9527	19
42	0.3040	0.3191	3.1334	0.9527	18
43	0.3043	0.3195	3.1303	0.9526	17
44	0.3046	0.3198	3.1271	0.9525	16
45	0.3049	0.3201	3.1240	0.9524	15
46	0.3051	0.3204	3.1209	0.9523	14
47	0.3054	0.3207	3.1178	0.9522	13
48	0.3057	0.3211	3.1146	0.9521	12
49	0.3060	0.3214	3.1115	0.9520	11
50	0.3062	0.3217	3.1084	0.9520	10
51	0.3065	0.3220	3.1053	0.9519	9
52	0.3068	0.3223	3.1022	0.9518	8
53	0.3071	0.3227	3.0991	0.9517	7
54	0.3074	0.3230	3.0961	0.9516	6
55	0.3076	0.3233	3.0930	0.9515	5
56	0.3079	0.3236	3.0899	0.9514	4
57	0.3082	0.3240	3.0868	0.9513	3
58	0.3085	0.3243	3.0838	0.9512	2
59	0.3087	0.3246	3.0807	0.9511	1
60	0.3090	0.3249	3.0777	0.9511	0
	Cos	Cot	Tan	Sin	′

′	Sin	Tan	Cot	Cos	
0	0.3090	0.3249	3.0777	0.9511	60
1	0.3093	0.3252	3.0746	0.9510	59
2	0.3096	0.3256	3.0716	0.9509	58
3	0.3098	0.3259	3.0686	0.9508	57
4	0.3101	0.3262	3.0655	0.9507	56
5	0.3104	0.3265	3.0625	0.9506	55
6	0.3107	0.3269	3.0595	0.9505	54
7	0.3110	0.3272	3.0565	0.9504	53
8	0.3112	0.3275	3.0535	0.9503	52
9	0.3115	0.3278	3.0505	0.9502	51
10	0.3118	0.3281	3.0475	0.9502	50
11	0.3121	0.3285	3.0445	0.9501	49
12	0.3123	0.3288	3.0415	0.9500	48
13	0.3126	0.3291	3.0385	0.9499	47
14	0.3129	0.3294	3.0356	0.9498	46
15	0.3132	0.3298	3.0326	0.9497	45
16	0.3134	0.3301	3.0296	0.9496	44
17	0.3137	0.3304	3.0267	0.9495	43
18	0.3140	0.3307	3.0237	0.9494	42
19	0.3143	0.3310	3.0208	0.9493	41
20	0.3145	0.3314	3.0178	0.9492	40
21	0.3148	0.3317	3.0149	0.9492	39
22	0.3151	0.3320	3.0120	0.9491	38
23	0.3154	0.3323	3.0090	0.9490	37
24	0.3156	0.3327	3.0061	0.9489	36
25	0.3159	0.3330	3.0032	0.9488	35
26	0.3162	0.3333	3.0003	0.9487	34
27	0.3165	0.3336	2.9974	0.9486	33
28	0.3168	0.3339	2.9945	0.9485	32
29	0.3170	0.3343	2.9916	0.9484	31
30	0.3173	0.3346	2.9887	0.9483	30
31	0.3176	0.3349	2.9858	0.9482	29
32	0.3179	0.3352	2.9829	0.9481	28
33	0.3181	0.3356	2.9800	0.9480	27
34	0.3184	0.3359	2.9772	0.9480	26
35	0.3187	0.3362	2.9743	0.9479	25
36	0.3190	0.3365	2.9714	0.9478	24
37	0.3192	0.3369	2.9686	0.9477	23
38	0.3195	0.3372	2.9657	0.9476	22
39	0.3198	0.3375	2.9629	0.9475	21
40	0.3201	0.3378	2.9600	0.9474	20
41	0.3203	0.3382	2.9572	0.9473	19
42	0.3206	0.3385	2.9544	0.9472	18
43	0.3209	0.3388	2.9515	0.9471	17
44	0.3212	0.3391	2.9487	0.9470	16
45	0.3214	0.3395	2.9459	0.9469	15
46	0.3217	0.3398	2.9431	0.9468	14
47	0.3220	0.3401	2.9403	0.9467	13
48	0.3223	0.3404	2.9375	0.9466	12
49	0.3225	0.3408	2.9347	0.9466	11
50	0.3228	0.3411	2.9319	0.9465	10
51	0.3231	0.3414	2.9291	0.9464	9
52	0.3234	0.3417	2.9263	0.9463	8
53	0.3236	0.3421	2.9235	0.9462	7
54	0.3239	0.3424	2.9208	0.9461	6
55	0.3242	0.3427	2.9180	0.9460	5
56	0.3245	0.3430	2.9152	0.9459	4
57	0.3247	0.3434	2.9125	0.9458	3
58	0.3250	0.3437	2.9097	0.9457	2
59	0.3253	0.3440	2.9070	0.9456	1
60	0.3256	0.3443	2.9042	0.9455	0
	Cos	Cot	Tan	Sin	′

′	Sin	Tan	Cot	Cos	
0	0.3256	0.3443	2.9042	0.9455	60
1	0.3258	0.3447	2.9015	0.9454	59
2	0.3261	0.3450	2.8987	0.9453	58
3	0.3264	0.3453	2.8960	0.9452	57
4	0.3267	0.3456	2.8933	0.9451	56
5	0.3269	0.3460	2.8905	0.9450	55
6	0.3272	0.3463	2.8878	0.9449	54
7	0.3275	0.3466	2.8851	0.9449	53
8	0.3278	0.3469	2.8824	0.9448	52
9	0.3280	0.3473	2.8797	0.9447	51
10	0.3283	0.3476	2.8770	0.9446	50
11	0.3286	0.3479	2.8743	0.9445	49
12	0.3289	0.3482	2.8716	0.9444	48
13	0.3291	0.3486	2.8689	0.9443	47
14	0.3294	0.3489	2.8662	0.9442	46
15	0.3297	0.3492	2.8636	0.9441	45
16	0.3300	0.3495	2.8609	0.9440	44
17	0.3302	0.3499	2.8582	0.9439	43
18	0.3305	0.3502	2.8556	0.9438	42
19	0.3308	0.3505	2.8529	0.9437	41
20	0.3311	0.3508	2.8502	0.9436	40
21	0.3313	0.3512	2.8476	0.9435	39
22	0.3316	0.3515	2.8449	0.9434	38
23	0.3319	0.3518	2.8423	0.9433	37
24	0.3322	0.3522	2.8397	0.9432	36
25	0.3324	0.3525	2.8370	0.9431	35
26	0.3327	0.3528	2.8344	0.9430	34
27	0.3330	0.3531	2.8318	0.9429	33
28	0.3333	0.3535	2.8291	0.9428	32
29	0.3335	0.3538	2.8265	0.9427	31
30	0.3338	0.3541	2.8239	0.9426	30
31	0.3341	0.3544	2.8213	0.9425	29
32	0.3344	0.3548	2.8187	0.9424	28
33	0.3346	0.3551	2.8161	0.9423	27
34	0.3349	0.3554	2.8135	0.9423	26
35	0.3352	0.3558	2.8109	0.9422	25
36	0.3355	0.3561	2.8083	0.9421	24
37	0.3357	0.3564	2.8057	0.9420	23
38	0.3360	0.3567	2.8032	0.9419	22
39	0.3363	0.3571	2.8006	0.9418	21
40	0.3365	0.3574	2.7980	0.9417	20
41	0.3368	0.3577	2.7955	0.9416	19
42	0.3371	0.3581	2.7929	0.9415	18
43	0.3374	0.3584	2.7903	0.9414	17
44	0.3376	0.3587	2.7878	0.9413	16
45	0.3379	0.3590	2.7852	0.9412	15
46	0.3382	0.3594	2.7827	0.9411	14
47	0.3385	0.3597	2.7801	0.9410	13
48	0.3387	0.3600	2.7776	0.9409	12
49	0.3390	0.3604	2.7751	0.9408	11
50	0.3393	0.3607	2.7725	0.9407	10
51	0.3396	0.3610	2.7700	0.9406	9
52	0.3398	0.3613	2.7675	0.9405	8
53	0.3401	0.3617	2.7650	0.9404	7
54	0.3404	0.3620	2.7625	0.9403	6
55	0.3407	0.3623	2.7600	0.9402	5
56	0.3409	0.3627	2.7575	0.9401	4
57	0.3412	0.3630	2.7550	0.9400	3
58	0.3415	0.3633	2.7525	0.9399	2
59	0.3417	0.3636	2.7500	0.9398	1
60	0.3420	0.3640	2.7475	0.9397	0
	Cos	Cot	Tan	Sin	′

′	Sin	Tan	Cot	Cos	
0	0.3420	0.3640	2.7475	0.9397	60
1	0.3423	0.3643	2.7450	0.9396	59
2	0.3426	0.3646	2.7425	0.9395	58
3	0.3428	0.3650	2.7400	0.9394	57
4	0.3431	0.3653	2.7376	0.9393	56
5	0.3434	0.3656	2.7351	0.9392	55
6	0.3437	0.3659	2.7326	0.9391	54
7	0.3439	0.3663	2.7302	0.9390	53
8	0.3442	0.3666	2.7277	0.9389	52
9	0.3445	0.3669	2.7253	0.9388	51
10	0.3448	0.3673	2.7228	0.9387	50
11	0.3450	0.3676	2.7204	0.9386	49
12	0.3453	0.3679	2.7179	0.9385	48
13	0.3456	0.3683	2.7155	0.9384	47
14	0.3458	0.3686	2.7130	0.9383	46
15	0.3461	0.3689	2.7106	0.9382	45
16	0.3464	0.3693	2.7082	0.9381	44
17	0.3467	0.3696	2.7058	0.9380	43
18	0.3469	0.3699	2.7034	0.9379	42
19	0.3472	0.3702	2.7009	0.9378	41
20	0.3475	0.3706	2.6985	0.9377	40
21	0.3478	0.3709	2.6961	0.9376	39
22	0.3480	0.3712	2.6937	0.9375	38
23	0.3483	0.3716	2.6913	0.9374	37
24	0.3486	0.3719	2.6889	0.9373	36
25	0.3488	0.3722	2.6865	0.9372	35
26	0.3491	0.3726	2.6841	0.9371	34
27	0.3494	0.3729	2.6818	0.9370	33
28	0.3497	0.3732	2.6794	0.9369	32
29	0.3499	0.3736	2.6770	0.9368	31
30	0.3502	0.3739	2.6746	0.9367	30
31	0.3505	0.3742	2.6723	0.9366	29
32	0.3508	0.3745	2.6699	0.9365	28
33	0.3510	0.3749	2.6675	0.9364	27
34	0.3513	0.3752	2.6652	0.9363	26
35	0.3516	0.3755	2.6628	0.9362	25
36	0.3518	0.3759	2.6605	0.9361	24
37	0.3521	0.3762	2.6581	0.9360	23
38	0.3524	0.3765	2.6558	0.9359	22
39	0.3527	0.3769	2.6534	0.9358	21
40	0.3529	0.3772	2.6511	0.9356	20
41	0.3532	0.3775	2.6488	0.9355	19
42	0.3535	0.3779	2.6464	0.9354	18
43	0.3537	0.3782	2.6441	0.9353	17
44	0.3540	0.3785	2.6418	0.9352	16
45	0.3543	0.3789	2.6395	0.9351	15
46	0.3546	0.3792	2.6371	0.9350	14
47	0.3548	0.3795	2.6348	0.9349	13
48	0.3551	0.3799	2.6325	0.9348	12
49	0.3554	0.3802	2.6302	0.9347	11
50	0.3557	0.3805	2.6279	0.9346	10
51	0.3559	0.3809	2.6256	0.9345	9
52	0.3562	0.3812	2.6233	0.9344	8
53	0.3565	0.3815	2.6210	0.9343	7
54	0.3567	0.3819	2.6187	0.9342	6
55	0.3570	0.3822	2.6165	0.9341	5
56	0.3573	0.3825	2.6142	0.9340	4
57	0.3576	0.3829	2.6119	0.9339	3
58	0.3578	0.3832	2.6096	0.9338	2
59	0.3581	0.3835	2.6074	0.9337	1
60	0.3584	0.3839	2.6051	0.9336	0
′	Cos	Cot	Tan	Sin	

′	Sin	Tan	Cot	Cos	
0	0.3584	0.3839	2.6051	0.9336	60
1	0.3586	0.3842	2.6028	0.9335	59
2	0.3589	0.3845	2.6006	0.9334	58
3	0.3592	0.3849	2.5983	0.9333	57
4	0.3595	0.3852	2.5961	0.9332	56
5	0.3597	0.3855	2.5938	0.9331	55
6	0.3600	0.3859	2.5916	0.9330	54
7	0.3603	0.3862	2.5893	0.9328	53
8	0.3605	0.3865	2.5871	0.9327	52
9	0.3608	0.3869	2.5848	0.9326	51
10	0.3611	0.3872	2.5826	0.9325	50
11	0.3614	0.3875	2.5804	0.9324	49
12	0.3616	0.3879	2.5782	0.9323	48
13	0.3619	0.3882	2.5759	0.9322	47
14	0.3622	0.3885	2.5737	0.9321	46
15	0.3624	0.3889	2.5715	0.9320	45
16	0.3627	0.3892	2.5693	0.9319	44
17	0.3630	0.3895	2.5671	0.9318	43
18	0.3633	0.3899	2.5649	0.9317	42
19	0.3635	0.3902	2.5627	0.9316	41
20	0.3638	0.3906	2.5605	0.9315	40
21	0.3641	0.3909	2.5583	0.9314	39
22	0.3643	0.3912	2.5561	0.9313	38
23	0.3646	0.3916	2.5539	0.9312	37
24	0.3649	0.3919	2.5517	0.9311	36
25	0.3651	0.3922	2.5495	0.9309	35
26	0.3654	0.3926	2.5473	0.9308	34
27	0.3657	0.3929	2.5452	0.9307	33
28	0.3660	0.3932	2.5430	0.9306	32
29	0.3662	0.3936	2.5408	0.9305	31
30	0.3665	0.3939	2.5386	0.9304	30
31	0.3668	0.3942	2.5365	0.9303	29
32	0.3670	0.3946	2.5343	0.9302	28
33	0.3673	0.3949	2.5322	0.9301	27
34	0.3676	0.3953	2.5300	0.9300	26
35	0.3679	0.3956	2.5279	0.9299	25
36	0.3681	0.3959	2.5257	0.9298	24
37	0.3684	0.3963	2.5236	0.9297	23
38	0.3687	0.3966	2.5214	0.9296	22
39	0.3689	0.3969	2.5193	0.9295	21
40	0.3692	0.3973	2.5172	0.9293	20
41	0.3695	0.3976	2.5150	0.9292	19
42	0.3697	0.3979	2.5129	0.9291	18
43	0.3700	0.3983	2.5108	0.9290	17
44	0.3703	0.3986	2.5086	0.9289	16
45	0.3706	0.3990	2.5065	0.9288	15
46	0.3708	0.3993	2.5044	0.9287	14
47	0.3711	0.3996	2.5023	0.9286	13
48	0.3714	0.4000	2.5002	0.9285	12
49	0.3716	0.4003	2.4981	0.9284	11
50	0.3719	0.4006	2.4960	0.9283	10
51	0.3722	0.4010	2.4939	0.9282	9
52	0.3724	0.4013	2.4918	0.9281	8
53	0.3727	0.4017	2.4897	0.9279	7
54	0.3730	0.4020	2.4876	0.9278	6
55	0.3733	0.4023	2.4855	0.9277	5
56	0.3735	0.4027	2.4834	0.9276	4
57	0.3738	0.4030	2.4813	0.9275	3
58	0.3741	0.4033	2.4792	0.9274	2
59	0.3743	0.4037	2.4772	0.9273	1
60	0.3746	0.4040	2.4751	0.9272	0
′	Cos	Cot	Tan	Sin	

′	Sin	Tan	Cot	Cos	
0	0.3746	0.4040	2.4751	0.9272	60
1	0.3749	0.4044	2.4730	0.9271	59
2	0.3751	0.4047	2.4709	0.9270	58
3	0.3754	0.4050	2.4689	0.9269	57
4	0.3757	0.4054	2.4668	0.9267	56
5	0.3760	0.4057	2.4648	0.9266	55
6	0.3762	0.4061	2.4627	0.9265	54
7	0.3765	0.4064	2.4606	0.9264	53
8	0.3768	0.4067	2.4586	0.9263	52
9	0.3770	0.4071	2.4566	0.9262	51
10	0.3773	0.4074	2.4545	0.9261	50
11	0.3776	0.4078	2.4525	0.9260	49
12	0.3778	0.4081	2.4504	0.9259	48
13	0.3781	0.4084	2.4484	0.9258	47
14	0.3784	0.4088	2.4464	0.9257	46
15	0.3786	0.4091	2.4443	0.9255	45
16	0.3789	0.4095	2.4423	0.9254	44
17	0.3792	0.4098	2.4403	0.9253	43
18	0.3795	0.4101	2.4383	0.9252	42
19	0.3797	0.4105	2.4362	0.9251	41
20	0.3800	0.4108	2.4342	0.9250	40
21	0.3803	0.4111	2.4322	0.9249	39
22	0.3805	0.4115	2.4302	0.9248	38
23	0.3808	0.4118	2.4282	0.9247	37
24	0.3811	0.4122	2.4262	0.9245	36
25	0.3813	0.4125	2.4242	0.9244	35
26	0.3816	0.4129	2.4222	0.9243	34
27	0.3819	0.4132	2.4202	0.9242	33
28	0.3821	0.4135	2.4182	0.9241	32
29	0.3824	0.4139	2.4162	0.9240	31
30	0.3827	0.4142	2.4142	0.9239	30
31	0.3830	0.4146	2.4122	0.9238	29
32	0.3832	0.4149	2.4102	0.9237	28
33	0.3835	0.4152	2.4083	0.9235	27
34	0.3838	0.4156	2.4063	0.9234	26
35	0.3840	0.4159	2.4043	0.9233	25
36	0.3843	0.4163	2.4023	0.9232	24
37	0.3846	0.4166	2.4004	0.9231	23
38	0.3848	0.4169	2.3984	0.9230	22
39	0.3851	0.4173	2.3964	0.9229	21
40	0.3854	0.4176	2.3945	0.9228	20
41	0.3856	0.4180	2.3925	0.9227	19
42	0.3859	0.4183	2.3906	0.9225	18
43	0.3862	0.4187	2.3886	0.9224	17
44	0.3864	0.4190	2.3867	0.9223	16
45	0.3867	0.4193	2.3847	0.9222	15
46	0.3870	0.4197	2.3828	0.9221	14
47	0.3872	0.4200	2.3808	0.9220	13
48	0.3875	0.4204	2.3789	0.9219	12
49	0.3878	0.4207	2.3770	0.9218	11
50	0.3881	0.4210	2.3750	0.9216	10
51	0.3883	0.4214	2.3731	0.9215	9
52	0.3886	0.4217	2.3712	0.9214	8
53	0.3889	0.4221	2.3693	0.9213	7
54	0.3891	0.4224	2.3673	0.9212	6
55	0.3894	0.4228	2.3654	0.9211	5
56	0.3897	0.4231	2.3635	0.9210	4
57	0.3899	0.4234	2.3616	0.9208	3
58	0.3902	0.4238	2.3597	0.9207	2
59	0.3905	0.4241	2.3578	0.9206	1
60	0.3907	0.4245	2.3559	0.9205	0
	Cos	Cot	Tan	Sin	′

′	Sin	Tan	Cot	Cos	
0	0.3907	0.4245	2.3559	0.9205	60
1	0.3910	0.4248	2.3539	0.9204	59
2	0.3913	0.4252	2.3520	0.9203	58
3	0.3915	0.4255	2.3501	0.9202	57
4	0.3918	0.4258	2.3483	0.9200	56
5	0.3921	0.4262	2.3464	0.9199	55
6	0.3923	0.4265	2.3445	0.9198	54
7	0.3926	0.4269	2.3426	0.9197	53
8	0.3929	0.4272	2.3407	0.9196	52
9	0.3931	0.4276	2.3388	0.9195	51
10	0.3934	0.4279	2.3369	0.9194	50
11	0.3937	0.4283	2.3351	0.9192	49
12	0.3939	0.4286	2.3332	0.9191	48
13	0.3942	0.4289	2.3313	0.9190	47
14	0.3945	0.4293	2.3294	0.9189	46
15	0.3947	0.4296	2.3276	0.9188	45
16	0.3950	0.4300	2.3257	0.9187	44
17	0.3953	0.4303	2.3238	0.9186	43
18	0.3955	0.4307	2.3220	0.9184	42
19	0.3958	0.4310	2.3201	0.9183	41
20	0.3961	0.4314	2.3183	0.9182	40
21	0.3963	0.4317	2.3164	0.9181	39
22	0.3966	0.4320	2.3146	0.9180	38
23	0.3969	0.4324	2.3127	0.9179	37
24	0.3971	0.4327	2.3109	0.9178	36
25	0.3974	0.4331	2.3090	0.9176	35
26	0.3977	0.4334	2.3072	0.9175	34
27	0.3979	0.4338	2.3053	0.9174	33
28	0.3982	0.4341	2.3035	0.9173	32
29	0.3985	0.4345	2.3017	0.9172	31
30	0.3987	0.4348	2.2998	0.9171	30
31	0.3990	0.4352	2.2980	0.9169	29
32	0.3993	0.4355	2.2962	0.9168	28
33	0.3995	0.4359	2.2944	0.9167	27
34	0.3998	0.4362	2.2925	0.9166	26
35	0.4001	0.4365	2.2907	0.9165	25
36	0.4003	0.4369	2.2889	0.9164	24
37	0.4006	0.4372	2.2871	0.9162	23
38	0.4009	0.4376	2.2853	0.9161	22
39	0.4011	0.4379	2.2835	0.9160	21
40	0.4014	0.4383	2.2817	0.9159	20
41	0.4017	0.4386	2.2799	0.9158	19
42	0.4019	0.4390	2.2781	0.9157	18
43	0.4022	0.4393	2.2763	0.9155	17
44	0.4025	0.4397	2.2745	0.9154	16
45	0.4027	0.4400	2.2727	0.9153	15
46	0.4030	0.4404	2.2709	0.9152	14
47	0.4033	0.4407	2.2691	0.9151	13
48	0.4035	0.4411	2.2673	0.9150	12
49	0.4038	0.4414	2.2655	0.9148	11
50	0.4041	0.4417	2.2637	0.9147	10
51	0.4043	0.4421	2.2620	0.9146	9
52	0.4046	0.4424	2.2602	0.9145	8
53	0.4049	0.4428	2.2584	0.9144	7
54	0.4051	0.4431	2.2566	0.9143	6
55	0.4054	0.4435	2.2549	0.9141	5
56	0.4057	0.4438	2.2531	0.9140	4
57	0.4059	0.4442	2.2513	0.9139	3
58	0.4062	0.4445	2.2496	0.9138	2
59	0.4065	0.4449	2.2478	0.9137	1
60	0.4067	0.4452	2.2460	0.9135	0
	Cos	Cot	Tan	Sin	′

'	Sin	Tan	Cot	Cos	
0	0.4067	0.4452	2.2460	0.9135	60
1	0.4070	0.4456	2.2443	0.9134	59
2	0.4073	0.4459	2.2425	0.9133	58
3	0.4075	0.4463	2.2408	0.9132	57
4	0.4078	0.4466	2.2390	0.9131	56
5	0.4081	0.4470	2.2373	0.9130	55
6	0.4083	0.4473	2.2355	0.9128	54
7	0.4086	0.4477	2.2338	0.9127	53
8	0.4089	0.4480	2.2320	0.9126	52
9	0.4091	0.4484	2.2303	0.9125	51
10	0.4094	0.4487	2.2286	0.9124	50
11	0.4097	0.4491	2.2268	0.9122	49
12	0.4099	0.4494	2.2251	0.9121	48
13	0.4102	0.4498	2.2234	0.9120	47
14	0.4105	0.4501	2.2216	0.9119	46
15	0.4107	0.4505	2.2199	0.9118	45
16	0.4110	0.4508	2.2182	0.9116	44
17	0.4112	0.4512	2.2165	0.9115	43
18	0.4115	0.4515	2.2148	0.9114	42
19	0.4118	0.4519	2.2130	0.9113	41
20	0.4120	0.4522	2.2113	0.9112	40
21	0.4123	0.4526	2.2096	0.9110	39
22	0.4126	0.4529	2.2079	0.9109	38
23	0.4128	0.4533	2.2062	0.9108	37
24	0.4131	0.4536	2.2045	0.9107	36
25	0.4134	0.4540	2.2028	0.9106	35
26	0.4136	0.4543	2.2011	0.9104	34
27	0.4139	0.4547	2.1994	0.9103	33
28	0.4142	0.4550	2.1977	0.9102	32
29	0.4144	0.4554	2.1960	0.9101	31
30	0.4147	0.4557	2.1943	0.9100	30
31	0.4150	0.4561	2.1926	0.9098	29
32	0.4152	0.4564	2.1909	0.9097	28
33	0.4155	0.4568	2.1892	0.9096	27
34	0.4158	0.4571	2.1876	0.9095	26
35	0.4160	0.4575	2.1859	0.9094	25
36	0.4163	0.4578	2.1842	0.9092	24
37	0.4165	0.4582	2.1825	0.9091	23
38	0.4168	0.4585	2.1808	0.9090	22
39	0.4171	0.4589	2.1792	0.9089	21
40	0.4173	0.4592	2.1775	0.9088	20
41	0.4176	0.4596	2.1758	0.9086	19
42	0.4179	0.4599	2.1742	0.9085	18
43	0.4181	0.4603	2.1725	0.9084	17
44	0.4184	0.4607	2.1708	0.9083	16
45	0.4187	0.4610	2.1692	0.9081	15
46	0.4189	0.4614	2.1675	0.9080	14
47	0.4192	0.4617	2.1659	0.9079	13
48	0.4195	0.4621	2.1642	0.9078	12
49	0.4197	0.4624	2.1625	0.9077	11
50	0.4200	0.4628	2.1609	0.9075	10
51	0.4202	0.4631	2.1592	0.9074	9
52	0.4205	0.4635	2.1576	0.9073	8
53	0.4208	0.4638	2.1560	0.9072	7
54	0.4210	0.4642	2.1543	0.9070	6
55	0.4213	0.4645	2.1527	0.9069	5
56	0.4216	0.4649	2.1510	0.9068	4
57	0.4218	0.4652	2.1494	0.9067	3
58	0.4221	0.4656	2.1478	0.9066	2
59	0.4224	0.4660	2.1461	0.9064	1
60	0.4226	0.4663	2.1445	0.9063	0
'	Cos	Cot	Tan	Sin	'

'	Sin	Tan	Cot	Cos	
0	0.4226	0.4663	2.1445	0.9063	60
1	0.4229	0.4667	2.1429	0.9062	59
2	0.4231	0.4670	2.1413	0.9061	58
3	0.4234	0.4674	2.1396	0.9059	57
4	0.4237	0.4677	2.1380	0.9058	56
5	0.4239	0.4681	2.1364	0.9057	55
6	0.4242	0.4684	2.1348	0.9056	54
7	0.4245	0.4688	2.1332	0.9054	53
8	0.4247	0.4691	2.1315	0.9053	52
9	0.4250	0.4695	2.1299	0.9052	51
10	0.4253	0.4699	2.1283	0.9051	50
11	0.4255	0.4702	2.1267	0.9050	49
12	0.4258	0.4706	2.1251	0.9048	48
13	0.4260	0.4709	2.1235	0.9047	47
14	0.4263	0.4713	2.1219	0.9046	46
15	0.4266	0.4716	2.1203	0.9045	45
16	0.4268	0.4720	2.1187	0.9043	44
17	0.4271	0.4723	2.1171	0.9042	43
18	0.4274	0.4727	2.1155	0.9041	42
19	0.4276	0.4731	2.1139	0.9040	41
20	0.4279	0.4734	2.1123	0.9038	40
21	0.4281	0.4738	2.1107	0.9037	39
22	0.4284	0.4741	2.1092	0.9036	38
23	0.4287	0.4745	2.1076	0.9035	37
24	0.4289	0.4748	2.1060	0.9033	36
25	0.4292	0.4752	2.1044	0.9032	35
26	0.4295	0.4755	2.1028	0.9031	34
27	0.4297	0.4759	2.1013	0.9030	33
28	0.4300	0.4763	2.0997	0.9028	32
29	0.4302	0.4766	2.0981	0.9027	31
30	0.4305	0.4770	2.0965	0.9026	30
31	0.4308	0.4773	2.0950	0.9025	29
32	0.4310	0.4777	2.0934	0.9023	28
33	0.4313	0.4780	2.0918	0.9022	27
34	0.4316	0.4784	2.0903	0.9021	26
35	0.4318	0.4788	2.0887	0.9020	25
36	0.4321	0.4791	2.0872	0.9018	24
37	0.4323	0.4795	2.0856	0.9017	23
38	0.4326	0.4798	2.0840	0.9016	22
39	0.4329	0.4802	2.0825	0.9015	21
40	0.4331	0.4806	2.0809	0.9013	20
41	0.4334	0.4809	2.0794	0.9012	19
42	0.4337	0.4813	2.0778	0.9011	18
43	0.4339	0.4816	2.0763	0.9010	17
44	0.4342	0.4820	2.0748	0.9008	16
45	0.4344	0.4823	2.0732	0.9007	15
46	0.4347	0.4827	2.0717	0.9006	14
47	0.4350	0.4831	2.0701	0.9004	13
48	0.4352	0.4834	2.0686	0.9003	12
49	0.4355	0.4838	2.0671	0.9002	11
50	0.4358	0.4841	2.0655	0.9001	10
51	0.4360	0.4845	2.0640	0.8999	9
52	0.4363	0.4849	2.0625	0.8998	8
53	0.4365	0.4852	2.0609	0.8997	7
54	0.4368	0.4856	2.0594	0.8996	6
55	0.4371	0.4859	2.0579	0.8994	5
56	0.4373	0.4863	2.0564	0.8993	4
57	0.4376	0.4867	2.0549	0.8992	3
58	0.4378	0.4870	2.0533	0.8990	2
59	0.4381	0.4874	2.0518	0.8989	1
60	0.4384	0.4877	2.0503	0.8988	0
	Cos	Cot	Tan	Sin	'

*116° 206° *296° **26°** NATURAL **27°** *117° 207° *297°

′	Sin	Tan	Cot	Cos	
0	0.4384	0.4877	2.0503	0.8988	60
1	0.4386	0.4881	2.0488	0.8987	59
2	0.4389	0.4885	2.0473	0.8985	58
3	0.4392	0.4888	2.0458	0.8984	57
4	0.4394	0.4892	2.0443	0.8983	56
5	0.4397	0.4895	2.0428	0.8982	55
6	0.4399	0.4899	2.0413	0.8980	54
7	0.4402	0.4903	2.0398	0.8979	53
8	0.4405	0.4906	2.0383	0.8978	52
9	0.4407	0.4910	2.0368	0.8976	51
10	0.4410	0.4913	2.0353	0.8975	50
11	0.4412	0.4917	2.0338	0.8974	49
12	0.4415	0.4921	2.0323	0.8973	48
13	0.4418	0.4924	2.0308	0.8971	47
14	0.4420	0.4928	2.0293	0.8970	46
15	0.4423	0.4931	2.0278	0.8969	45
16	0.4425	0.4935	2.0263	0.8967	44
17	0.4428	0.4939	2.0248	0.8966	43
18	0.4431	0.4942	2.0233	0.8965	42
19	0.4433	0.4946	2.0219	0.8964	41
20	0.4436	0.4950	2.0204	0.8962	40
21	0.4439	0.4953	2.0189	0.8961	39
22	0.4441	0.4957	2.0174	0.8960	38
23	0.4444	0.4960	2.0160	0.8958	37
24	0.4446	0.4964	2.0145	0.8957	36
25	0.4449	0.4968	2.0130	0.8956	35
26	0.4452	0.4971	2.0115	0.8955	34
27	0.4454	0.4975	2.0101	0.8953	33
28	0.4457	0.4979	2.0086	0.8952	32
29	0.4459	0.4982	2.0072	0.8951	31
30	0.4462	0.4986	2.0057	0.8949	30
31	0.4465	0.4989	2.0042	0.8948	29
32	0.4467	0.4993	2.0028	0.8947	28
33	0.4470	0.4997	2.0013	0.8945	27
34	0.4472	0.5000	1.9999	0.8944	26
35	0.4475	0.5004	1.9984	0.8943	25
36	0.4478	0.5008	1.9970	0.8942	24
37	0.4480	0.5011	1.9955	0.8940	23
38	0.4483	0.5015	1.9941	0.8939	22
39	0.4485	0.5019	1.9926	0.8938	21
40	0.4488	0.5022	1.9912	0.8936	20
41	0.4491	0.5026	1.9897	0.8935	19
42	0.4493	0.5029	1.9883	0.8934	18
43	0.4496	0.5033	1.9868	0.8932	17
44	0.4498	0.5037	1.9854	0.8931	16
45	0.4501	0.5040	1.9840	0.8930	15
46	0.4504	0.5044	1.9825	0.8928	14
47	0.4506	0.5048	1.9811	0.8927	13
48	0.4509	0.5051	1.9797	0.8926	12
49	0.4511	0.5055	1.9782	0.8925	11
50	0.4514	0.5059	1.9768	0.8923	10
51	0.4517	0.5062	1.9754	0.8922	9
52	0.4519	0.5066	1.9740	0.8921	8
53	0.4522	0.5070	1.9725	0.8919	7
54	0.4524	0.5073	1.9711	0.8918	6
55	0.4527	0.5077	1.9697	0.8917	5
56	0.4530	0.5081	1.9683	0.8915	4
57	0.4532	0.5084	1.9669	0.8914	3
58	0.4535	0.5088	1.9654	0.8913	2
59	0.4537	0.5092	1.9640	0.8911	1
60	0.4540	0.5095	1.9626	0.8910	0
	Cos	Cot	Tan	Sin	′

′	Sin	Tan	Cot	Cos	
0	0.4540	0.5095	1.9626	0.8910	60
1	0.4542	0.5099	1.9612	0.8909	59
2	0.4545	0.5103	1.9598	0.8907	58
3	0.4548	0.5106	1.9584	0.8906	57
4	0.4550	0.5110	1.9570	0.8905	56
5	0.4553	0.5114	1.9556	0.8903	55
6	0.4555	0.5117	1.9542	0.8902	54
7	0.4558	0.5121	1.9528	0.8901	53
8	0.4561	0.5125	1.9514	0.8899	52
9	0.4563	0.5128	1.9500	0.8898	51
10	0.4566	0.5132	1.9486	0.8897	50
11	0.4568	0.5136	1.9472	0.8895	49
12	0.4571	0.5139	1.9458	0.8894	48
13	0.4574	0.5143	1.9444	0.8893	47
14	0.4576	0.5147	1.9430	0.8892	46
15	0.4579	0.5150	1.9416	0.8890	45
16	0.4581	0.5154	1.9402	0.8889	44
17	0.4584	0.5158	1.9388	0.8888	43
18	0.4586	0.5161	1.9375	0.8886	42
19	0.4589	0.5165	1.9361	0.8885	41
20	0.4592	0.5169	1.9347	0.8884	40
21	0.4594	0.5172	1.9333	0.8882	39
22	0.4597	0.5176	1.9319	0.8881	38
23	0.4599	0.5180	1.9306	0.8879	37
24	0.4602	0.5184	1.9292	0.8878	36
25	0.4605	0.5187	1.9278	0.8877	35
26	0.4607	0.5191	1.9265	0.8875	34
27	0.4610	0.5195	1.9251	0.8874	33
28	0.4612	0.5198	1.9237	0.8873	32
29	0.4615	0.5202	1.9223	0.8871	31
30	0.4617	0.5206	1.9210	0.8870	30
31	0.4620	0.5209	1.9196	0.8869	29
32	0.4623	0.5213	1.9183	0.8867	28
33	0.4625	0.5217	1.9169	0.8866	27
34	0.4628	0.5220	1.9155	0.8865	26
35	0.4630	0.5224	1.9142	0.8863	25
36	0.4633	0.5228	1.9128	0.8862	24
37	0.4636	0.5232	1.9115	0.8861	23
38	0.4638	0.5235	1.9101	0.8859	22
39	0.4641	0.5239	1.9088	0.8858	21
40	0.4643	0.5243	1.9074	0.8857	20
41	0.4646	0.5246	1.9061	0.8855	19
42	0.4648	0.5250	1.9047	0.8854	18
43	0.4651	0.5254	1.9034	0.8853	17
44	0.4654	0.5258	1.9020	0.8851	16
45	0.4656	0.5261	1.9007	0.8850	15
46	0.4659	0.5265	1.8993	0.8849	14
47	0.4661	0.5269	1.8980	0.8847	13
48	0.4664	0.5272	1.8967	0.8846	12
49	0.4666	0.5276	1.8953	0.8844	11
50	0.4669	0.5280	1.8940	0.8843	10
51	0.4672	0.5283	1.8927	0.8842	9
52	0.4674	0.5287	1.8913	0.8840	8
53	0.4677	0.5291	1.8900	0.8839	7
54	0.4679	0.5295	1.8887	0.8838	6
55	0.4682	0.5298	1.8873	0.8836	5
56	0.4684	0.5302	1.8860	0.8835	4
57	0.4687	0.5306	1.8847	0.8834	3
58	0.4690	0.5310	1.8834	0.8832	2
59	0.4692	0.5313	1.8820	0.8831	1
60	0.4695	0.5317	1.8807	0.8829	0
	Cos	Cot	Tan	Sin	′

*153° 243° *333° **63°** NATURAL **62°** *152° 242° *332°

	Sin	Tan	Cot	Cos	
	0.4695	0.5317	1.8807	0.8829	60
	0.4697	0.5321	1.8794	0.8828	59
	0.4700	0.5325	1.8781	0.8827	58
	0.4702	0.5328	1.8768	0.8825	57
	0.4705	0.5332	1.8755	0.8824	56
	0.4708	0.5336	1.8741	0.8823	55
	0.4710	0.5340	1.8728	0.8821	54
	0.4713	0.5343	1.8715	0.8820	53
	0.4715	0.5347	1.8702	0.8819	52
	0.4718	0.5351	1.8689	0.8817	51
	0.4720	0.5354	1.8676	0.8816	50
	0.4723	0.5358	1.8663	0.8814	49
	0.4726	0.5362	1.8650	0.8813	48
	0.4728	0.5366	1.8637	0.8812	47
	0.4731	0.5369	1.8624	0.8810	46
	0.4733	0.5373	1.8611	0.8809	45
	0.4736	0.5377	1.8598	0.8808	44
	0.4738	0.5381	1.8585	0.8806	43
	0.4741	0.5384	1.8572	0.8805	42
	0.4743	0.5388	1.8559	0.8803	41
	0.4746	0.5392	1.8546	0.8802	40
	0.4749	0.5396	1.8533	0.8801	39
	0.4751	0.5399	1.8520	0.8799	38
	0.4754	0.5403	1.8507	0.8798	37
	0.4756	0.5407	1.8495	0.8796	36
	0.4759	0.5411	1.8482	0.8795	35
	0.4761	0.5415	1.8469	0.8794	34
	0.4764	0.5418	1.8456	0.8792	33
	0.4766	0.5422	1.8443	0.8791	32
	0.4769	0.5426	1.8430	0.8790	31
	0.4772	0.5430	1.8418	0.8788	30
	0.4774	0.5433	1.8405	0.8787	29
	0.4777	0.5437	1.8392	0.8785	28
	0.4779	0.5441	1.8379	0.8784	27
	0.4782	0.5445	1.8367	0.8783	26
	0.4784	0.5448	1.8354	0.8781	25
	0.4787	0.5452	1.8341	0.8780	24
	0.4789	0.5456	1.8329	0.8778	23
	0.4792	0.5460	1.8316	0.8777	22
	0.4795	0.5464	1.8303	0.8776	21
	0.4797	0.5467	1.8291	0.8774	20
	0.4800	0.5471	1.8278	0.8773	19
	0.4802	0.5475	1.8265	0.8771	18
	0.4805	0.5479	1.8253	0.8770	17
	0.4807	0.5482	1.8240	0.8769	16
	0.4810	0.5486	1.8228	0.8767	15
	0.4812	0.5490	1.8215	0.8766	14
	0.4815	0.5494	1.8202	0.8764	13
	0.4818	0.5498	1.8190	0.8763	12
	0.4820	0.5501	1.8177	0.8762	11
	0.4823	0.5505	1.8165	0.8760	10
	0.4825	0.5509	1.8152	0.8759	9
	0.4828	0.5513	1.8140	0.8757	8
	0.4830	0.5517	1.8127	0.8756	7
	0.4833	0.5520	1.8115	0.8755	6
	0.4835	0.5524	1.8103	0.8753	5
	0.4838	0.5528	1.8090	0.8752	4
	0.4840	0.5532	1.8078	0.8750	3
	0.4843	0.5535	1.8065	0.8749	2
	0.4846	0.5539	1.8053	0.8748	1
	0.4848	0.5543	1.8040	0.8746	0
	Cos	Cot	Tan	Sin	'

'	Sin	Tan	Cot	Cos	
0	0.4848	0.5543	1.8040	0.8746	60
1	0.4851	0.5547	1.8028	0.8745	59
2	0.4853	0.5551	1.8016	0.8743	58
3	0.4856	0.5555	1.8003	0.8742	57
4	0.4858	0.5558	1.7991	0.8741	56
5	0.4861	0.5562	1.7979	0.8739	55
6	0.4863	0.5566	1.7966	0.8738	54
7	0.4866	0.5570	1.7954	0.8736	53
8	0.4868	0.5574	1.7942	0.8735	52
9	0.4871	0.5577	1.7930	0.8733	51
10	0.4874	0.5581	1.7917	0.8732	50
11	0.4876	0.5585	1.7905	0.8731	49
12	0.4879	0.5589	1.7893	0.8729	48
13	0.4881	0.5593	1.7881	0.8728	47
14	0.4884	0.5596	1.7868	0.8726	46
15	0.4886	0.5600	1.7856	0.8725	45
16	0.4889	0.5604	1.7844	0.8724	44
17	0.4891	0.5608	1.7832	0.8722	43
18	0.4894	0.5612	1.7820	0.8721	42
19	0.4896	0.5616	1.7808	0.8719	41
20	0.4899	0.5619	1.7796	0.8718	40
21	0.4901	0.5623	1.7783	0.8716	39
22	0.4904	0.5627	1.7771	0.8715	38
23	0.4907	0.5631	1.7759	0.8714	37
24	0.4909	0.5635	1.7747	0.8712	36
25	0.4912	0.5639	1.7735	0.8711	35
26	0.4914	0.5642	1.7723	0.8709	34
27	0.4917	0.5646	1.7711	0.8708	33
28	0.4919	0.5650	1.7699	0.8706	32
29	0.4922	0.5654	1.7687	0.8705	31
30	0.4924	0.5658	1.7675	0.8704	30
31	0.4927	0.5662	1.7663	0.8702	29
32	0.4929	0.5665	1.7651	0.8701	28
33	0.4932	0.5669	1.7639	0.8699	27
34	0.4934	0.5673	1.7627	0.8698	26
35	0.4937	0.5677	1.7615	0.8696	25
36	0.4939	0.5681	1.7603	0.8695	24
37	0.4942	0.5685	1.7591	0.8694	23
38	0.4944	0.5688	1.7579	0.8692	22
39	0.4947	0.5692	1.7567	0.8691	21
40	0.4950	0.5696	1.7556	0.8689	20
41	0.4952	0.5700	1.7544	0.8688	19
42	0.4955	0.5704	1.7532	0.8686	18
43	0.4957	0.5708	1.7520	0.8685	17
44	0.4960	0.5712	1.7508	0.8683	16
45	0.4962	0.5715	1.7496	0.8682	15
46	0.4965	0.5719	1.7485	0.8681	14
47	0.4967	0.5723	1.7473	0.8679	13
48	0.4970	0.5727	1.7461	0.8678	12
49	0.4972	0.5731	1.7449	0.8676	11
50	0.4975	0.5735	1.7437	0.8675	10
51	0.4977	0.5739	1.7426	0.8673	9
52	0.4980	0.5743	1.7414	0.8672	8
53	0.4982	0.5746	1.7402	0.8670	7
54	0.4985	0.5750	1.7391	0.8669	6
55	0.4987	0.5754	1.7379	0.8668	5
56	0.4990	0.5758	1.7367	0.8666	4
57	0.4992	0.5762	1.7355	0.8665	3
58	0.4995	0.5766	1.7344	0.8663	2
59	0.4997	0.5770	1.7332	0.8662	1
60	0.5000	0.5774	1.7321	0.8660	0
	Cos	Cot	Tan	Sin	'

	Sin	Tan	Cot	Cos	
0	0.5000	0.5774	1.7321	0.8660	60
1	0.5003	0.5777	1.7309	0.8659	59
2	0.5005	0.5781	1.7297	0.8657	58
3	0.5008	0.5785	1.7286	0.8656	57
4	0.5010	0.5789	1.7274	0.8654	56
5	0.5013	0.5793	1.7262	0.8653	55
6	0.5015	0.5797	1.7251	0.8652	54
7	0.5018	0.5801	1.7239	0.8650	53
8	0.5020	0.5805	1.7228	0.8649	52
9	0.5023	0.5808	1.7216	0.8647	51
10	0.5025	0.5812	1.7205	0.8646	50
11	0.5028	0.5816	1.7193	0.8644	49
12	0.5030	0.5820	1.7182	0.8643	48
13	0.5033	0.5824	1.7170	0.8641	47
14	0.5035	0.5828	1.7159	0.8640	46
15	0.5038	0.5832	1.7147	0.8638	45
16	0.5040	0.5836	1.7136	0.8637	44
17	0.5043	0.5840	1.7124	0.8635	43
18	0.5045	0.5844	1.7113	0.8634	42
19	0.5048	0.5847	1.7102	0.8632	41
20	0.5050	0.5851	1.7090	0.8631	40
21	0.5053	0.5855	1.7079	0.8630	39
22	0.5055	0.5859	1.7067	0.8628	38
23	0.5058	0.5863	1.7056	0.8627	37
24	0.5060	0.5867	1.7045	0.8625	36
25	0.5063	0.5871	1.7033	0.8624	35
26	0.5065	0.5875	1.7022	0.8622	34
27	0.5068	0.5879	1.7011	0.8621	33
28	0.5070	0.5883	1.6999	0.8619	32
29	0.5073	0.5887	1.6988	0.8618	31
30	0.5075	0.5890	1.6977	0.8616	30
31	0.5078	0.5894	1.6965	0.8615	29
32	0.5080	0.5898	1.6954	0.8613	28
33	0.5083	0.5902	1.6943	0.8612	27
34	0.5085	0.5906	1.6932	0.8610	26
35	0.5088	0.5910	1.6920	0.8609	25
36	0.5090	0.5914	1.6909	0.8607	24
37	0.5093	0.5918	1.6898	0.8606	23
38	0.5095	0.5922	1.6887	0.8604	22
39	0.5098	0.5926	1.6875	0.8603	21
40	0.5100	0.5930	1.6864	0.8601	20
41	0.5103	0.5934	1.6853	0.8600	19
42	0.5105	0.5938	1.6842	0.8599	18
43	0.5108	0.5942	1.6831	0.8597	17
44	0.5110	0.5945	1.6820	0.8596	16
45	0.5113	0.5949	1.6808	0.8594	15
46	0.5115	0.5953	1.6797	0.8593	14
47	0.5118	0.5957	1.6786	0.8591	13
48	0.5120	0.5961	1.6775	0.8590	12
49	0.5123	0.5965	1.6764	0.8588	11
50	0.5125	0.5969	1.6753	0.8587	10
51	0.5128	0.5973	1.6742	0.8585	9
52	0.5130	0.5977	1.6731	0.8584	8
53	0.5133	0.5981	1.6720	0.8582	7
54	0.5135	0.5985	1.6709	0.8581	6
55	0.5138	0.5989	1.6698	0.8579	5
56	0.5140	0.5993	1.6687	0.8578	4
57	0.5143	0.5997	1.6676	0.8576	3
58	0.5145	0.6001	1.6665	0.8575	2
59	0.5148	0.6005	1.6654	0.8573	1
60	0.5150	0.6009	1.6643	0.8572	0
	Cos	Cot	Tan	Sin	

	Sin	Tan	Cot	Cos	
0	0.5150	0.6009	1.6643	0.8572	60
1	0.5153	0.6013	1.6632	0.8570	59
2	0.5155	0.6017	1.6621	0.8569	58
3	0.5158	0.6020	1.6610	0.8567	57
4	0.5160	0.6024	1.6599	0.8566	56
5	0.5163	0.6028	1.6588	0.8564	55
6	0.5165	0.6032	1.6577	0.8563	54
7	0.5168	0.6036	1.6566	0.8561	53
8	0.5170	0.6040	1.6555	0.8560	52
9	0.5173	0.6044	1.6545	0.8558	51
10	0.5175	0.6048	1.6534	0.8557	50
11	0.5178	0.6052	1.6523	0.8555	49
12	0.5180	0.6056	1.6512	0.8554	48
13	0.5183	0.6060	1.6501	0.8552	47
14	0.5185	0.6064	1.6490	0.8551	46
15	0.5188	0.6068	1.6479	0.8549	45
16	0.5190	0.6072	1.6469	0.8548	44
17	0.5193	0.6076	1.6458	0.8546	43
18	0.5195	0.6080	1.6447	0.8545	42
19	0.5198	0.6084	1.6436	0.8543	41
20	0.5200	0.6088	1.6426	0.8542	40
21	0.5203	0.6092	1.6415	0.8540	39
22	0.5205	0.6096	1.6404	0.8539	38
23	0.5208	0.6100	1.6393	0.8537	37
24	0.5210	0.6104	1.6383	0.8536	36
25	0.5213	0.6108	1.6372	0.8534	35
26	0.5215	0.6112	1.6361	0.8532	34
27	0.5218	0.6116	1.6351	0.8531	33
28	0.5220	0.6120	1.6340	0.8529	32
29	0.5223	0.6124	1.6329	0.8528	31
30	0.5225	0.6128	1.6319	0.8526	30
31	0.5227	0.6132	1.6308	0.8525	29
32	0.5230	0.6136	1.6297	0.8523	28
33	0.5232	0.6140	1.6287	0.8522	27
34	0.5235	0.6144	1.6276	0.8520	26
35	0.5237	0.6148	1.6265	0.8519	25
36	0.5240	0.6152	1.6255	0.8517	24
37	0.5242	0.6156	1.6244	0.8516	23
38	0.5245	0.6160	1.6234	0.8514	22
39	0.5247	0.6164	1.6223	0.8513	21
40	0.5250	0.6168	1.6212	0.8511	20
41	0.5252	0.6172	1.6202	0.8510	19
42	0.5255	0.6176	1.6191	0.8508	18
43	0.5257	0.6180	1.6181	0.8507	17
44	0.5260	0.6184	1.6170	0.8505	16
45	0.5262	0.6188	1.6160	0.8504	15
46	0.5265	0.6192	1.6149	0.8502	14
47	0.5267	0.6196	1.6139	0.8500	13
48	0.5270	0.6200	1.6128	0.8499	12
49	0.5272	0.6204	1.6118	0.8497	11
50	0.5275	0.6208	1.6107	0.8496	10
51	0.5277	0.6212	1.6097	0.8494	9
52	0.5279	0.6216	1.6087	0.8493	8
53	0.5282	0.6220	1.6076	0.8491	7
54	0.5284	0.6224	1.6066	0.8490	6
55	0.5287	0.6228	1.6055	0.8488	5
56	0.5289	0.6233	1.6045	0.8487	4
57	0.5292	0.6237	1.6034	0.8485	3
58	0.5294	0.6241	1.6024	0.8484	2
59	0.5297	0.6245	1.6014	0.8482	1
60	0.5299	0.6249	1.6003	0.8480	0
	Cos	Cot	Tan	Sin	

	Sin	Tan	Cot	Cos	
	0.5299	0.6249	1.6003	0.8480	60
	0.5302	0.6253	1.5993	0.8479	59
	0.5304	0.6257	1.5983	0.8477	58
	0.5307	0.6261	1.5972	0.8476	57
	0.5309	0.6265	1.5962	0.8474	56
	0.5312	0.6269	1.5952	0.8473	55
	0.5314	0.6273	1.5941	0.8471	54
	0.5316	0.6277	1.5931	0.8470	53
	0.5319	0.6281	1.5921	0.8468	52
	0.5321	0.6285	1.5911	0.8467	51
	0.5324	0.6289	1.5900	0.8465	50
	0.5326	0.6293	1.5890	0.8463	49
	0.5329	0.6297	1.5880	0.8462	48
	0.5331	0.6301	1.5869	0.8460	47
	0.5334	0.6305	1.5859	0.8459	46
	0.5336	0.6310	1.5849	0.8457	45
	0.5339	0.6314	1.5839	0.8456	44
	0.5341	0.6318	1.5829	0.8454	43
	0.5344	0.6322	1.5818	0.8453	42
	0.5346	0.6326	1.5808	0.8451	41
	0.5348	0.6330	1.5798	0.8450	40
	0.5351	0.6334	1.5788	0.8448	39
	0.5353	0.6338	1.5778	0.8446	38
	0.5356	0.6342	1.5768	0.8445	37
	0.5358	0.6346	1.5757	0.8443	36
	0.5361	0.6350	1.5747	0.8442	35
	0.5363	0.6354	1.5737	0.8440	34
	0.5366	0.6358	1.5727	0.8439	33
	0.5368	0.6363	1.5717	0.8437	32
	0.5371	0.6367	1.5707	0.8435	31
	0.5373	0.6371	1.5697	0.8434	30
	0.5375	0.6375	1.5687	0.8432	29
	0.5378	0.6379	1.5677	0.8431	28
	0.5380	0.6383	1.5667	0.8429	27
	0.5383	0.6387	1.5657	0.8428	26
	0.5385	0.6391	1.5647	0.8426	25
	0.5388	0.6395	1.5637	0.8425	24
	0.5390	0.6399	1.5627	0.8423	23
	0.5393	0.6403	1.5617	0.8421	22
	0.5395	0.6408	1.5607	0.8420	21
	0.5398	0.6412	1.5597	0.8418	20
	0.5400	0.6416	1.5587	0.8417	19
	0.5402	0.6420	1.5577	0.8415	18
	0.5405	0.6424	1.5567	0.8414	17
	0.5407	0.6428	1.5557	0.8412	16
	0.5410	0.6432	1.5547	0.8410	15
	0.5412	0.6436	1.5537	0.8409	14
	0.5415	0.6440	1.5527	0.8407	13
	0.5417	0.6445	1.5517	0.8406	12
	0.5420	0.6449	1.5507	0.8404	11
	0.5422	0.6453	1.5497	0.8403	10
	0.5424	0.6457	1.5487	0.8401	9
	0.5427	0.6461	1.5477	0.8399	8
	0.5429	0.6465	1.5468	0.8398	7
	0.5432	0.6469	1.5458	0.8396	6
	0.5434	0.6473	1.5448	0.8395	5
	0.5437	0.6478	1.5438	0.8393	4
	0.5439	0.6482	1.5428	0.8391	3
	0.5442	0.6486	1.5418	0.8390	2
	0.5444	0.6490	1.5408	0.8388	1
60	0.5446	0.6494	1.5399	0.8387	0
	Cos	Cot	Tan	Sin	

'	Sin	Tan	Cot	Cos	
0	0.5446	0.6494	1.5399	0.8387	60
1	0.5449	0.6498	1.5389	0.8385	59
2	0.5451	0.6502	1.5379	0.8384	58
3	0.5454	0.6506	1.5369	0.8382	57
4	0.5456	0.6511	1.5359	0.8380	56
5	0.5459	0.6515	1.5350	0.8379	55
6	0.5461	0.6519	1.5340	0.8377	54
7	0.5463	0.6523	1.5330	0.8376	53
8	0.5466	0.6527	1.5320	0.8374	52
9	0.5468	0.6531	1.5311	0.8372	51
10	0.5471	0.6536	1.5301	0.8371	50
11	0.5473	0.6540	1.5291	0.8369	49
12	0.5476	0.6544	1.5282	0.8368	48
13	0.5478	0.6548	1.5272	0.8366	47
14	0.5480	0.6552	1.5262	0.8364	46
15	0.5483	0.6556	1.5253	0.8363	45
16	0.5485	0.6560	1.5243	0.8361	44
17	0.5488	0.6565	1.5233	0.8360	43
18	0.5490	0.6569	1.5224	0.8358	42
19	0.5493	0.6573	1.5214	0.8356	41
20	0.5495	0.6577	1.5204	0.8355	40
21	0.5498	0.6581	1.5195	0.8353	39
22	0.5500	0.6585	1.5185	0.8352	38
23	0.5502	0.6590	1.5175	0.8350	37
24	0.5505	0.6594	1.5166	0.8348	36
25	0.5507	0.6598	1.5156	0.8347	35
26	0.5510	0.6602	1.5147	0.8345	34
27	0.5512	0.6606	1.5137	0.8344	33
28	0.5515	0.6610	1.5127	0.8342	32
29	0.5517	0.6615	1.5118	0.8340	31
30	0.5519	0.6619	1.5108	0.8339	30
31	0.5522	0.6623	1.5099	0.8337	29
32	0.5524	0.6627	1.5089	0.8336	28
33	0.5527	0.6631	1.5080	0.8334	27
34	0.5529	0.6636	1.5070	0.8332	26
35	0.5531	0.6640	1.5061	0.8331	25
36	0.5534	0.6644	1.5051	0.8329	24
37	0.5536	0.6648	1.5042	0.8328	23
38	0.5539	0.6652	1.5032	0.8326	22
39	0.5541	0.6657	1.5023	0.8324	21
40	0.5544	0.6661	1.5013	0.8323	20
41	0.5546	0.6665	1.5004	0.8321	19
42	0.5548	0.6669	1.4994	0.8320	18
43	0.5551	0.6673	1.4985	0.8318	17
44	0.5553	0.6678	1.4975	0.8316	16
45	0.5556	0.6682	1.4966	0.8315	15
46	0.5558	0.6686	1.4957	0.8313	14
47	0.5561	0.6690	1.4947	0.8311	13
48	0.5563	0.6694	1.4938	0.8310	12
49	0.5565	0.6699	1.4928	0.8308	11
50	0.5568	0.6703	1.4919	0.8307	10
51	0.5570	0.6707	1.4910	0.8305	9
52	0.5573	0.6711	1.4900	0.8303	8
53	0.5575	0.6715	1.4891	0.8302	7
54	0.5577	0.6720	1.4882	0.8300	6
55	0.5580	0.6724	1.4872	0.8298	5
56	0.5582	0.6728	1.4863	0.8297	4
57	0.5585	0.6732	1.4854	0.8295	3
58	0.5587	0.6737	1.4844	0.8294	2
59	0.5590	0.6741	1.4835	0.8292	1
60	0.5592	0.6745	1.4826	0.8290	0
	Cos	Cot	Tan	Sin	

′	Sin	Tan	Cot	Cos	
0	0.5592	0.6745	1.4826	0.8290	60
1	0.5594	0.6749	1.4816	0.8289	59
2	0.5597	0.6754	1.4807	0.8287	58
3	0.5599	0.6758	1.4798	0.8285	57
4	0.5602	0.6762	1.4788	0.8284	56
5	0.5604	0.6766	1.4779	0.8282	55
6	0.5606	0.6771	1.4770	0.8281	54
7	0.5609	0.6775	1.4761	0.8279	53
8	0.5611	0.6779	1.4751	0.8277	52
9	0.5614	0.6783	1.4742	0.8276	51
10	0.5616	0.6787	1.4733	0.8274	50
11	0.5618	0.6792	1.4724	0.8272	49
12	0.5621	0.6796	1.4715	0.8271	48
13	0.5623	0.6800	1.4705	0.8269	47
14	0.5626	0.6805	1.4696	0.8268	46
15	0.5628	0.6809	1.4687	0.8266	45
16	0.5630	0.6813	1.4678	0.8264	44
17	0.5633	0.6817	1.4669	0.8263	43
18	0.5635	0.6822	1.4659	0.8261	42
19	0.5638	0.6826	1.4650	0.8259	41
20	0.5640	0.6830	1.4641	0.8258	40
21	0.5642	0.6834	1.4632	0.8256	39
22	0.5645	0.6839	1.4623	0.8254	38
23	0.5647	0.6843	1.4614	0.8253	37
24	0.5650	0.6847	1.4605	0.8251	36
25	0.5652	0.6851	1.4596	0.8249	35
26	0.5654	0.6856	1.4586	0.8248	34
27	0.5657	0.6860	1.4577	0.8246	33
28	0.5659	0.6864	1.4568	0.8245	32
29	0.5662	0.6869	1.4559	0.8243	31
30	0.5664	0.6873	1.4550	0.8241	30
31	0.5666	0.6877	1.4541	0.8240	29
32	0.5669	0.6881	1.4532	0.8238	28
33	0.5671	0.6886	1.4523	0.8236	27
34	0.5674	0.6890	1.4514	0.8235	26
35	0.5676	0.6894	1.4505	0.8233	25
36	0.5678	0.6899	1.4496	0.8231	24
37	0.5681	0.6903	1.4487	0.8230	23
38	0.5683	0.6907	1.4478	0.8228	22
39	0.5686	0.6911	1.4469	0.8226	21
40	0.5688	0.6916	1.4460	0.8225	20
41	0.5690	0.6920	1.4451	0.8223	19
42	0.5693	0.6924	1.4442	0.8221	18
43	0.5695	0.6929	1.4433	0.8220	17
44	0.5698	0.6933	1.4424	0.8218	16
45	0.5700	0.6937	1.4415	0.8216	15
46	0.5702	0.6942	1.4406	0.8215	14
47	0.5705	0.6946	1.4397	0.8213	13
48	0.5707	0.6950	1.4388	0.8211	12
49	0.5710	0.6954	1.4379	0.8210	11
50	0.5712	0.6959	1.4370	0.8208	10
51	0.5714	0.6963	1.4361	0.8207	9
52	0.5717	0.6967	1.4352	0.8205	8
53	0.5719	0.6972	1.4344	0.8203	7
54	0.5721	0.6976	1.4335	0.8202	6
55	0.5724	0.6980	1.4326	0.8200	5
56	0.5726	0.6985	1.4317	0.8198	4
57	0.5729	0.6989	1.4308	0.8197	3
58	0.5731	0.6993	1.4299	0.8195	2
59	0.5733	0.6998	1.4290	0.8193	1
60	0.5736	0.7002	1.4281	0.8192	0
	Cos	Cot	Tan	Sin	′

′	Sin	Tan	Cot	Cos	
0	0.5736	0.7002	1.4281	0.8192	60
1	0.5738	0.7006	1.4273	0.8190	59
2	0.5741	0.7011	1.4264	0.8188	58
3	0.5743	0.7015	1.4255	0.8187	57
4	0.5745	0.7019	1.4246	0.8185	56
5	0.5748	0.7024	1.4237	0.8183	55
6	0.5750	0.7028	1.4229	0.8181	54
7	0.5752	0.7032	1.4220	0.8180	53
8	0.5755	0.7037	1.4211	0.8178	52
9	0.5757	0.7041	1.4202	0.8176	51
10	0.5760	0.7046	1.4193	0.8175	50
11	0.5762	0.7050	1.4185	0.8173	49
12	0.5764	0.7054	1.4176	0.8171	48
13	0.5767	0.7059	1.4167	0.8170	47
14	0.5769	0.7063	1.4158	0.8168	46
15	0.5771	0.7067	1.4150	0.8166	45
16	0.5774	0.7072	1.4141	0.8165	44
17	0.5776	0.7076	1.4132	0.8163	43
18	0.5779	0.7080	1.4124	0.8161	42
19	0.5781	0.7085	1.4115	0.8160	41
20	0.5783	0.7089	1.4106	0.8158	40
21	0.5786	0.7094	1.4097	0.8156	39
22	0.5788	0.7098	1.4089	0.8155	38
23	0.5790	0.7102	1.4080	0.8153	37
24	0.5793	0.7107	1.4071	0.8151	36
25	0.5795	0.7111	1.4063	0.8150	35
26	0.5798	0.7115	1.4054	0.8148	34
27	0.5800	0.7120	1.4045	0.8146	33
28	0.5802	0.7124	1.4037	0.8145	32
29	0.5805	0.7129	1.4028	0.8143	31
30	0.5807	0.7133	1.4019	0.8141	30
31	0.5809	0.7137	1.4011	0.8139	29
32	0.5812	0.7142	1.4002	0.8138	28
33	0.5814	0.7146	1.3994	0.8136	27
34	0.5816	0.7151	1.3985	0.8134	26
35	0.5819	0.7155	1.3976	0.8133	25
36	0.5821	0.7159	1.3968	0.8131	24
37	0.5824	0.7164	1.3959	0.8129	23
38	0.5826	0.7168	1.3951	0.8128	22
39	0.5828	0.7173	1.3942	0.8126	21
40	0.5831	0.7177	1.3934	0.8124	20
41	0.5833	0.7181	1.3925	0.8123	19
42	0.5835	0.7186	1.3916	0.8121	18
43	0.5838	0.7190	1.3908	0.8119	17
44	0.5840	0.7195	1.3899	0.8117	16
45	0.5842	0.7199	1.3891	0.8116	15
46	0.5845	0.7203	1.3882	0.8114	14
47	0.5847	0.7208	1.3874	0.8112	13
48	0.5850	0.7212	1.3865	0.8111	12
49	0.5852	0.7217	1.3857	0.8109	11
50	0.5854	0.7221	1.3848	0.8107	10
51	0.5857	0.7226	1.3840	0.8106	9
52	0.5859	0.7230	1.3831	0.8104	8
53	0.5861	0.7234	1.3823	0.8102	7
54	0.5864	0.7239	1.3814	0.8100	6
55	0.5866	0.7243	1.3806	0.8099	5
56	0.5868	0.7248	1.3798	0.8097	4
57	0.5871	0.7252	1.3789	0.8095	3
58	0.5873	0.7257	1.3781	0.8094	2
59	0.5875	0.7261	1.3772	0.8092	1
60	0.5878	0.7265	1.3764	0.8090	0
	Cos	Cot	Tan	Sin	′

Sin	Tan	Cot	Cos	
0.5878	0.7265	1.3764	0.8090	60
0.5880	0.7270	1.3755	0.8088	59
0.5883	0.7274	1.3747	0.8087	58
0.5885	0.7279	1.3739	0.8085	57
0.5887	0.7283	1.3730	0.8083	56
0.5890	0.7288	1.3722	0.8082	55
0.5892	0.7292	1.3713	0.8080	54
0.5894	0.7297	1.3705	0.8078	53
0.5897	0.7301	1.3697	0.8076	52
0.5899	0.7306	1.3688	0.8075	51
0.5901	0.7310	1.3680	0.8073	50
0.5904	0.7314	1.3672	0.8071	49
0.5906	0.7319	1.3663	0.8070	48
0.5908	0.7323	1.3655	0.8068	47
0.5911	0.7328	1.3647	0.8066	46
0.5913	0.7332	1.3638	0.8064	45
0.5915	0.7337	1.3630	0.8063	44
0.5918	0.7341	1.3622	0.8061	43
0.5920	0.7346	1.3613	0.8059	42
0.5922	0.7350	1.3605	0.8058	41
0.5925	0.7355	1.3597	0.8056	40
0.5927	0.7359	1.3588	0.8054	39
0.5930	0.7364	1.3580	0.8052	38
0.5932	0.7368	1.3572	0.8051	37
0.5934	0.7373	1.3564	0.8049	36
0.5937	0.7377	1.3555	0.8047	35
0.5939	0.7382	1.3547	0.8045	34
0.5941	0.7386	1.3539	0.8044	33
0.5944	0.7391	1.3531	0.8042	32
0.5946	0.7395	1.3522	0.8040	31
0.5948	0.7400	1.3514	0.8039	30
0.5951	0.7404	1.3506	0.8037	29
0.5953	0.7409	1.3498	0.8035	28
0.5955	0.7413	1.3490	0.8033	27
0.5958	0.7418	1.3481	0.8032	26
0.5960	0.7422	1.3473	0.8030	25
0.5962	0.7427	1.3465	0.8028	24
0.5965	0.7431	1.3457	0.8026	23
0.5967	0.7436	1.3449	0.8025	22
0.5969	0.7440	1.3440	0.8023	21
0.5972	0.7445	1.3432	0.8021	20
0.5974	0.7449	1.3424	0.8019	19
0.5976	0.7454	1.3416	0.8018	18
0.5979	0.7458	1.3408	0.8016	17
0.5981	0.7463	1.3400	0.8014	16
0.5983	0.7467	1.3392	0.8013	15
0.5986	0.7472	1.3384	0.8011	14
0.5988	0.7476	1.3375	0.8009	13
0.5990	0.7481	1.3367	0.8007	12
0.5993	0.7485	1.3359	0.8006	11
0.5995	0.7490	1.3351	0.8004	10
0.5997	0.7495	1.3343	0.8002	9
0.6000	0.7499	1.3335	0.8000	8
0.6002	0.7504	1.3327	0.7999	7
0.6004	0.7508	1.3319	0.7997	6
0.6007	0.7513	1.3311	0.7995	5
0.6009	0.7517	1.3303	0.7993	4
0.6011	0.7522	1.3295	0.7992	3
0.6014	0.7526	1.3287	0.7990	2
0.6016	0.7531	1.3278	0.7988	1
0.6018	0.7536	1.3270	0.7986	0
Cos	Cot	Tan	Sin	′

′	Sin	Tan	Cot	Cos	
0	0.6018	0.7536	1.3270	0.7986	60
1	0.6020	0.7540	1.3262	0.7985	59
2	0.6023	0.7545	1.3254	0.7983	58
3	0.6025	0.7549	1.3246	0.7981	57
4	0.6027	0.7554	1.3238	0.7979	56
5	0.6030	0.7558	1.3230	0.7978	55
6	0.6032	0.7563	1.3222	0.7976	54
7	0.6034	0.7568	1.3214	0.7974	53
8	0.6037	0.7572	1.3206	0.7972	52
9	0.6039	0.7577	1.3198	0.7971	51
10	0.6041	0.7581	1.3190	0.7969	50
11	0.6044	0.7586	1.3182	0.7967	49
12	0.6046	0.7590	1.3175	0.7965	48
13	0.6048	0.7595	1.3167	0.7964	47
14	0.6051	0.7600	1.3159	0.7962	46
15	0.6053	0.7604	1.3151	0.7960	45
16	0.6055	0.7609	1.3143	0.7958	44
17	0.6058	0.7613	1.3135	0.7956	43
18	0.6060	0.7618	1.3127	0.7955	42
19	0.6062	0.7623	1.3119	0.7953	41
20	0.6065	0.7627	1.3111	0.7951	40
21	0.6067	0.7632	1.3103	0.7949	39
22	0.6069	0.7636	1.3095	0.7948	38
23	0.6071	0.7641	1.3087	0.7946	37
24	0.6074	0.7646	1.3079	0.7944	36
25	0.6076	0.7650	1.3072	0.7942	35
26	0.6078	0.7655	1.3064	0.7941	34
27	0.6081	0.7659	1.3056	0.7939	33
28	0.6083	0.7664	1.3048	0.7937	32
29	0.6085	0.7669	1.3040	0.7935	31
30	0.6088	0.7673	1.3032	0.7934	30
31	0.6090	0.7678	1.3024	0.7932	29
32	0.6092	0.7683	1.3017	0.7930	28
33	0.6095	0.7687	1.3009	0.7928	27
34	0.6097	0.7692	1.3001	0.7926	26
35	0.6099	0.7696	1.2993	0.7925	25
36	0.6101	0.7701	1.2985	0.7923	24
37	0.6104	0.7706	1.2977	0.7921	23
38	0.6106	0.7710	1.2970	0.7919	22
39	0.6108	0.7715	1.2962	0.7918	21
40	0.6111	0.7720	1.2954	0.7916	20
41	0.6113	0.7724	1.2946	0.7914	19
42	0.6115	0.7729	1.2938	0.7912	18
43	0.6118	0.7734	1.2931	0.7910	17
44	0.6120	0.7738	1.2923	0.7909	16
45	0.6122	0.7743	1.2915	0.7907	15
46	0.6124	0.7747	1.2907	0.7905	14
47	0.6127	0.7752	1.2900	0.7903	13
48	0.6129	0.7757	1.2892	0.7902	12
49	0.6131	0.7761	1.2884	0.7900	11
50	0.6134	0.7766	1.2876	0.7898	10
51	0.6136	0.7771	1.2869	0.7896	9
52	0.6138	0.7775	1.2861	0.7894	8
53	0.6141	0.7780	1.2853	0.7893	7
54	0.6143	0.7785	1.2846	0.7891	6
55	0.6145	0.7789	1.2838	0.7889	5
56	0.6147	0.7794	1.2830	0.7887	4
57	0.6150	0.7799	1.2822	0.7885	3
58	0.6152	0.7803	1.2815	0.7884	2
59	0.6154	0.7808	1.2807	0.7882	1
60	0.6157	0.7813	1.2799	0.7880	0
	Cos	Cot	Tan	Sin	′

*128° 218° *308° **38°** NATURAL **39°** *129° 219° *309°

′	Sin	Tan	Cot	Cos	
0	0.6157	0.7813	1.2799	0.7880	60
1	0.6159	0.7818	1.2792	0.7878	59
2	0.6161	0.7822	1.2784	0.7877	58
3	0.6163	0.7827	1.2776	0.7875	57
4	0.6166	0.7832	1.2769	0.7873	56
5	0.6168	0.7836	1.2761	0.7871	55
6	0.6170	0.7841	1.2753	0.7869	54
7	0.6173	0.7846	1.2746	0.7868	53
8	0.6175	0.7850	1.2738	0.7866	52
9	0.6177	0.7855	1.2731	0.7864	51
10	0.6180	0.7860	1.2723	0.7862	50
11	0.6182	0.7865	1.2715	0.7860	49
12	0.6184	0.7869	1.2708	0.7859	48
13	0.6186	0.7874	1.2700	0.7857	47
14	0.6189	0.7879	1.2693	0.7855	46
15	0.6191	0.7883	1.2685	0.7853	45
16	0.6193	0.7888	1.2677	0.7851	44
17	0.6196	0.7893	1.2670	0.7850	43
18	0.6198	0.7898	1.2662	0.7848	42
19	0.6200	0.7902	1.2655	0.7846	41
20	0.6202	0.7907	1.2647	0.7844	40
21	0.6205	0.7912	1.2640	0.7842	39
22	0.6207	0.7916	1.2632	0.7841	38
23	0.6209	0.7921	1.2624	0.7839	37
24	0.6211	0.7926	1.2617	0.7837	36
25	0.6214	0.7931	1.2609	0.7835	35
26	0.6216	0.7935	1.2602	0.7833	34
27	0.6218	0.7940	1.2594	0.7832	33
28	0.6221	0.7945	1.2587	0.7830	32
29	0.6223	0.7950	1.2579	0.7828	31
30	0.6225	0.7954	1.2572	0.7826	30
31	0.6227	0.7959	1.2564	0.7824	29
32	0.6230	0.7964	1.2557	0.7822	28
33	0.6232	0.7969	1.2549	0.7821	27
34	0.6234	0.7973	1.2542	0.7819	26
35	0.6237	0.7978	1.2534	0.7817	25
36	0.6239	0.7983	1.2527	0.7815	24
37	0.6241	0.7988	1.2519	0.7813	23
38	0.6243	0.7992	1.2512	0.7812	22
39	0.6246	0.7997	1.2504	0.7810	21
40	0.6248	0.8002	1.2497	0.7808	20
41	0.6250	0.8007	1.2489	0.7806	19
42	0.6252	0.8012	1.2482	0.7804	18
43	0.6255	0.8016	1.2475	0.7802	17
44	0.6257	0.8021	1.2467	0.7801	16
45	0.6259	0.8026	1.2460	0.7799	15
46	0.6262	0.8031	1.2452	0.7797	14
47	0.6264	0.8035	1.2445	0.7795	13
48	0.6266	0.8040	1.2437	0.7793	12
49	0.6268	0.8045	1.2430	0.7792	11
50	0.6271	0.8050	1.2423	0.7790	10
51	0.6273	0.8055	1.2415	0.7788	9
52	0.6275	0.8059	1.2408	0.7786	8
53	0.6277	0.8064	1.2401	0.7784	7
54	0.6280	0.8069	1.2393	0.7782	6
55	0.6282	0.8074	1.2386	0.7781	5
56	0.6284	0.8079	1.2378	0.7779	4
57	0.6286	0.8083	1.2371	0.7777	3
58	0.6289	0.8088	1.2364	0.7775	2
59	0.6291	0.8093	1.2356	0.7773	1
60	0.6293	0.8098	1.2349	0.7771	0
	Cos	Cot	Tan	Sin	′

′	Sin	Tan	Cot	Cos	
0	0.6293	0.8098	1.2349	0.7771	60
1	0.6295	0.8103	1.2342	0.7770	59
2	0.6298	0.8107	1.2334	0.7768	58
3	0.6300	0.8112	1.2327	0.7766	57
4	0.6302	0.8117	1.2320	0.7764	56
5	0.6305	0.8122	1.2312	0.7762	55
6	0.6307	0.8127	1.2305	0.7760	54
7	0.6309	0.8132	1.2298	0.7759	53
8	0.6311	0.8136	1.2290	0.7757	52
9	0.6314	0.8141	1.2283	0.7755	51
10	0.6316	0.8146	1.2276	0.7753	50
11	0.6318	0.8151	1.2268	0.7751	49
12	0.6320	0.8156	1.2261	0.7749	48
13	0.6323	0.8161	1.2254	0.7748	47
14	0.6325	0.8165	1.2247	0.7746	46
15	0.6327	0.8170	1.2239	0.7744	45
16	0.6329	0.8175	1.2232	0.7742	44
17	0.6332	0.8180	1.2225	0.7740	43
18	0.6334	0.8185	1.2218	0.7738	42
19	0.6336	0.8190	1.2210	0.7737	41
20	0.6338	0.8195	1.2203	0.7735	40
21	0.6341	0.8199	1.2196	0.7733	39
22	0.6343	0.8204	1.2189	0.7731	38
23	0.6345	0.8209	1.2181	0.7729	37
24	0.6347	0.8214	1.2174	0.7727	36
25	0.6350	0.8219	1.2167	0.7725	35
26	0.6352	0.8224	1.2160	0.7724	34
27	0.6354	0.8229	1.2153	0.7722	33
28	0.6356	0.8234	1.2145	0.7720	32
29	0.6359	0.8238	1.2138	0.7718	31
30	0.6361	0.8243	1.2131	0.7716	30
31	0.6363	0.8248	1.2124	0.7714	29
32	0.6365	0.8253	1.2117	0.7713	28
33	0.6368	0.8258	1.2109	0.7711	27
34	0.6370	0.8263	1.2102	0.7709	26
35	0.6372	0.8268	1.2095	0.7707	25
36	0.6374	0.8273	1.2088	0.7705	24
37	0.6376	0.8278	1.2081	0.7703	23
38	0.6379	0.8283	1.2074	0.7701	22
39	0.6381	0.8287	1.2066	0.7700	21
40	0.6383	0.8292	1.2059	0.7698	20
41	0.6385	0.8297	1.2052	0.7696	19
42	0.6388	0.8302	1.2045	0.7694	18
43	0.6390	0.8307	1.2038	0.7692	17
44	0.6392	0.8312	1.2031	0.7690	16
45	0.6394	0.8317	1.2024	0.7688	15
46	0.6397	0.8322	1.2017	0.7687	14
47	0.6399	0.8327	1.2009	0.7685	13
48	0.6401	0.8332	1.2002	0.7683	12
49	0.6403	0.8337	1.1995	0.7681	11
50	0.6406	0.8342	1.1988	0.7679	10
51	0.6408	0.8346	1.1981	0.7677	9
52	0.6410	0.8351	1.1974	0.7675	8
53	0.6412	0.8356	1.1967	0.7674	7
54	0.6414	0.8361	1.1960	0.7672	6
55	0.6417	0.8366	1.1953	0.7670	5
56	0.6419	0.8371	1.1946	0.7668	4
57	0.6421	0.8376	1.1939	0.7666	3
58	0.6423	0.8381	1.1932	0.7664	2
59	0.6426	0.8386	1.1925	0.7662	1
60	0.6428	0.8391	1.1918	0.7660	0
	Cos	Cot	Tan	Sin	′

*141° 231° *321° **51°** NATURAL **50°** *140° 230° *320°

′	Sin	Tan	Cot	Cos	
0	0.6428	0.8391	1.1918	0.7660	60
1	0.6430	0.8396	1.1910	0.7659	59
2	0.6432	0.8401	1.1903	0.7657	58
3	0.6435	0.8406	1.1896	0.7655	57
4	0.6437	0.8411	1.1889	0.7653	56
5	0.6439	0.8416	1.1882	0.7651	55
6	0.6441	0.8421	1.1875	0.7649	54
7	0.6443	0.8426	1.1868	0.7647	53
8	0.6446	0.8431	1.1861	0.7645	52
9	0.6448	0.8436	1.1854	0.7644	51
10	0.6450	0.8441	1.1847	0.7642	50
11	0.6452	0.8446	1.1840	0.7640	49
12	0.6455	0.8451	1.1833	0.7638	48
13	0.6457	0.8456	1.1826	0.7636	47
14	0.6459	0.8461	1.1819	0.7634	46
15	0.6461	0.8466	1.1812	0.7632	45
16	0.6463	0.8471	1.1806	0.7630	44
17	0.6466	0.8476	1.1799	0.7629	43
18	0.6468	0.8481	1.1792	0.7627	42
19	0.6470	0.8486	1.1785	0.7625	41
20	0.6472	0.8491	1.1778	0.7623	40
21	0.6475	0.8496	1.1771	0.7621	39
22	0.6477	0.8501	1.1764	0.7619	38
23	0.6479	0.8506	1.1757	0.7617	37
24	0.6481	0.8511	1.1750	0.7615	36
25	0.6483	0.8516	1.1743	0.7613	35
26	0.6486	0.8521	1.1736	0.7612	34
27	0.6488	0.8526	1.1729	0.7610	33
28	0.6490	0.8531	1.1722	0.7608	32
29	0.6492	0.8536	1.1715	0.7606	31
30	0.6494	0.8541	1.1708	0.7604	30
31	0.6497	0.8546	1.1702	0.7602	29
32	0.6499	0.8551	1.1695	0.7600	28
33	0.6501	0.8556	1.1688	0.7598	27
34	0.6503	0.8561	1.1681	0.7596	26
35	0.6506	0.8566	1.1674	0.7595	25
36	0.6508	0.8571	1.1667	0.7593	24
37	0.6510	0.8576	1.1660	0.7591	23
38	0.6512	0.8581	1.1653	0.7589	22
39	0.6514	0.8586	1.1647	0.7587	21
40	0.6517	0.8591	1.1640	0.7585	20
41	0.6519	0.8596	1.1633	0.7583	19
42	0.6521	0.8601	1.1626	0.7581	18
43	0.6523	0.8606	1.1619	0.7579	17
44	0.6525	0.8611	1.1612	0.7578	16
45	0.6528	0.8617	1.1606	0.7576	15
46	0.6530	0.8622	1.1599	0.7574	14
47	0.6532	0.8627	1.1592	0.7572	13
48	0.6534	0.8632	1.1585	0.7570	12
49	0.6536	0.8637	1.1578	0.7568	11
50	0.6539	0.8642	1.1571	0.7566	10
51	0.6541	0.8647	1.1565	0.7564	9
52	0.6543	0.8652	1.1558	0.7562	8
53	0.6545	0.8657	1.1551	0.7560	7
54	0.6547	0.8662	1.1544	0.7559	6
55	0.6550	0.8667	1.1538	0.7557	5
56	0.6552	0.8672	1.1531	0.7555	4
57	0.6554	0.8678	1.1524	0.7553	3
58	0.6556	0.8683	1.1517	0.7551	2
59	0.6558	0.8688	1.1510	0.7549	1
60	0.6561	0.8693	1.1504	0.7547	0
′	Cos	Cot	Tan	Sin	′

′	Sin	Tan	Cot	Cos	
0	0.6561	0.8693	1.1504	0.7547	60
1	0.6563	0.8698	1.1497	0.7545	59
2	0.6565	0.8703	1.1490	0.7543	58
3	0.6567	0.8708	1.1483	0.7541	57
4	0.6569	0.8713	1.1477	0.7539	56
5	0.6572	0.8718	1.1470	0.7538	55
6	0.6574	0.8724	1.1463	0.7536	54
7	0.6576	0.8729	1.1456	0.7534	53
8	0.6578	0.8734	1.1450	0.7532	52
9	0.6580	0.8739	1.1443	0.7530	51
10	0.6583	0.8744	1.1436	0.7528	50
11	0.6585	0.8749	1.1430	0.7526	49
12	0.6587	0.8754	1.1423	0.7524	48
13	0.6589	0.8759	1.1416	0.7522	47
14	0.6591	0.8765	1.1410	0.7520	46
15	0.6593	0.8770	1.1403	0.7518	45
16	0.6596	0.8775	1.1396	0.7516	44
17	0.6598	0.8780	1.1389	0.7515	43
18	0.6600	0.8785	1.1383	0.7513	42
19	0.6602	0.8790	1.1376	0.7511	41
20	0.6604	0.8796	1.1369	0.7509	40
21	0.6607	0.8801	1.1363	0.7507	39
22	0.6609	0.8806	1.1356	0.7505	38
23	0.6611	0.8811	1.1349	0.7503	37
24	0.6613	0.8816	1.1343	0.7501	36
25	0.6615	0.8821	1.1336	0.7499	35
26	0.6617	0.8827	1.1329	0.7497	34
27	0.6620	0.8832	1.1323	0.7495	33
28	0.6622	0.8837	1.1316	0.7493	32
29	0.6624	0.8842	1.1310	0.7491	31
30	0.6626	0.8847	1.1303	0.7490	30
31	0.6628	0.8852	1.1296	0.7488	29
32	0.6631	0.8858	1.1290	0.7486	28
33	0.6633	0.8863	1.1283	0.7484	27
34	0.6635	0.8868	1.1276	0.7482	26
35	0.6637	0.8873	1.1270	0.7480	25
36	0.6639	0.8878	1.1263	0.7478	24
37	0.6641	0.8884	1.1257	0.7476	23
38	0.6644	0.8889	1.1250	0.7474	22
39	0.6646	0.8894	1.1243	0.7472	21
40	0.6648	0.8899	1.1237	0.7470	20
41	0.6650	0.8904	1.1230	0.7468	19
42	0.6652	0.8910	1.1224	0.7466	18
43	0.6654	0.8915	1.1217	0.7464	17
44	0.6657	0.8920	1.1211	0.7463	16
45	0.6659	0.8925	1.1204	0.7461	15
46	0.6661	0.8931	1.1197	0.7459	14
47	0.6663	0.8936	1.1191	0.7457	13
48	0.6665	0.8941	1.1184	0.7455	12
49	0.6667	0.8946	1.1178	0.7453	11
50	0.6670	0.8952	1.1171	0.7451	10
51	0.6672	0.8957	1.1165	0.7449	9
52	0.6674	0.8962	1.1158	0.7447	8
53	0.6676	0.8967	1.1152	0.7445	7
54	0.6678	0.8972	1.1145	0.7443	6
55	0.6680	0.8978	1.1139	0.7441	5
56	0.6683	0.8983	1.1132	0.7439	4
57	0.6685	0.8988	1.1126	0.7437	3
58	0.6687	0.8994	1.1119	0.7435	2
59	0.6689	0.8999	1.1113	0.7433	1
60	0.6691	0.9004	1.1106	0.7431	0
′	Cos	Cot	Tan	Sin	′

′	Sin	Tan	Cot	Cos	
0	0.6691	0.9004	1.1106	0.7431	60
1	0.6693	0.9009	1.1100	0.7430	59
2	0.6696	0.9015	1.1093	0.7428	58
3	0.6698	0.9020	1.1087	0.7426	57
4	0.6700	0.9025	1.1080	0.7424	56
5	0.6702	0.9030	1.1074	0.7422	55
6	0.6704	0.9036	1.1067	0.7420	54
7	0.6706	0.9041	1.1061	0.7418	53
8	0.6709	0.9046	1.1054	0.7416	52
9	0.6711	0.9052	1.1048	0.7414	51
10	0.6713	0.9057	1.1041	0.7412	50
11	0.6715	0.9062	1.1035	0.7410	49
12	0.6717	0.9067	1.1028	0.7408	48
13	0.6719	0.9073	1.1022	0.7406	47
14	0.6722	0.9078	1.1016	0.7404	46
15	0.6724	0.9083	1.1009	0.7402	45
16	0.6726	0.9089	1.1003	0.7400	44
17	0.6728	0.9094	1.0996	0.7398	43
18	0.6730	0.9099	1.0990	0.7396	42
19	0.6732	0.9105	1.0983	0.7394	41
20	0.6734	0.9110	1.0977	0.7392	40
21	0.6737	0.9115	1.0971	0.7390	39
22	0.6739	0.9121	1.0964	0.7388	38
23	0.6741	0.9126	1.0958	0.7387	37
24	0.6743	0.9131	1.0951	0.7385	36
25	0.6745	0.9137	1.0945	0.7383	35
26	0.6747	0.9142	1.0939	0.7381	34
27	0.6749	0.9147	1.0932	0.7379	33
28	0.6752	0.9153	1.0926	0.7377	32
29	0.6754	0.9158	1.0919	0.7375	31
30	0.6756	0.9163	1.0913	0.7373	30
31	0.6758	0.9169	1.0907	0.7371	29
32	0.6760	0.9174	1.0900	0.7369	28
33	0.6762	0.9179	1.0894	0.7367	27
34	0.6764	0.9185	1.0888	0.7365	26
35	0.6767	0.9190	1.0881	0.7363	25
36	0.6769	0.9195	1.0875	0.7361	24
37	0.6771	0.9201	1.0869	0.7359	23
38	0.6773	0.9206	1.0862	0.7357	22
39	0.6775	0.9212	1.0856	0.7355	21
40	0.6777	0.9217	1.0850	0.7353	20
41	0.6779	0.9222	1.0843	0.7351	19
42	0.6782	0.9228	1.0837	0.7349	18
43	0.6784	0.9233	1.0831	0.7347	17
44	0.6786	0.9239	1.0824	0.7345	16
45	0.6788	0.9244	1.0818	0.7343	15
46	0.6790	0.9249	1.0812	0.7341	14
47	0.6792	0.9255	1.0805	0.7339	13
48	0.6794	0.9260	1.0799	0.7337	12
49	0.6797	0.9266	1.0793	0.7335	11
50	0.6799	0.9271	1.0786	0.7333	10
51	0.6801	0.9276	1.0780	0.7331	9
52	0.6803	0.9282	1.0774	0.7329	8
53	0.6805	0.9287	1.0768	0.7327	7
54	0.6807	0.9293	1.0761	0.7325	6
55	0.6809	0.9298	1.0755	0.7323	5
56	0.6811	0.9303	1.0749	0.7321	4
57	0.6814	0.9309	1.0742	0.7319	3
58	0.6816	0.9314	1.0736	0.7318	2
59	0.6818	0.9320	1.0730	0.7316	1
60	0.6820	0.9325	1.0724	0.7314	0
	Cos	Cot	Tan	Sin	′

′	Sin	Tan	Cot	Cos	
0	0.6820	0.9325	1.0724	0.7314	60
1	0.6822	0.9331	1.0717	0.7312	59
2	0.6824	0.9336	1.0711	0.7310	58
3	0.6826	0.9341	1.0705	0.7308	57
4	0.6828	0.9347	1.0699	0.7306	56
5	0.6831	0.9352	1.0692	0.7304	55
6	0.6833	0.9358	1.0686	0.7302	54
7	0.6835	0.9363	1.0680	0.7300	53
8	0.6837	0.9369	1.0674	0.7298	52
9	0.6839	0.9374	1.0668	0.7296	51
10	0.6841	0.9380	1.0661	0.7294	50
11	0.6843	0.9385	1.0655	0.7292	49
12	0.6845	0.9391	1.0649	0.7290	48
13	0.6848	0.9396	1.0643	0.7288	47
14	0.6850	0.9402	1.0637	0.7286	46
15	0.6852	0.9407	1.0630	0.7284	45
16	0.6854	0.9413	1.0624	0.7282	44
17	0.6856	0.9418	1.0618	0.7280	43
18	0.6858	0.9424	1.0612	0.7278	42
19	0.6860	0.9429	1.0606	0.7276	41
20	0.6862	0.9435	1.0599	0.7274	40
21	0.6865	0.9440	1.0593	0.7272	39
22	0.6867	0.9446	1.0587	0.7270	38
23	0.6869	0.9451	1.0581	0.7268	37
24	0.6871	0.9457	1.0575	0.7266	36
25	0.6873	0.9462	1.0569	0.7264	35
26	0.6875	0.9468	1.0562	0.7262	34
27	0.6877	0.9473	1.0556	0.7260	33
28	0.6879	0.9479	1.0550	0.7258	32
29	0.6881	0.9484	1.0544	0.7256	31
30	0.6884	0.9490	1.0538	0.7254	30
31	0.6886	0.9495	1.0532	0.7252	29
32	0.6888	0.9501	1.0526	0.7250	28
33	0.6890	0.9506	1.0519	0.7248	27
34	0.6892	0.9512	1.0513	0.7246	26
35	0.6894	0.9517	1.0507	0.7244	25
36	0.6896	0.9523	1.0501	0.7242	24
37	0.6898	0.9528	1.0495	0.7240	23
38	0.6900	0.9534	1.0489	0.7238	22
39	0.6903	0.9540	1.0483	0.7236	21
40	0.6905	0.9545	1.0477	0.7234	20
41	0.6907	0.9551	1.0470	0.7232	19
42	0.6909	0.9556	1.0464	0.7230	18
43	0.6911	0.9562	1.0458	0.7228	17
44	0.6913	0.9567	1.0452	0.7226	16
45	0.6915	0.9573	1.0446	0.7224	15
46	0.6917	0.9578	1.0440	0.7222	14
47	0.6919	0.9584	1.0434	0.7220	13
48	0.6921	0.9590	1.0428	0.7218	12
49	0.6924	0.9595	1.0422	0.7216	11
50	0.6926	0.9601	1.0416	0.7214	10
51	0.6928	0.9606	1.0410	0.7212	9
52	0.6930	0.9612	1.0404	0.7210	8
53	0.6932	0.9618	1.0398	0.7208	7
54	0.6934	0.9623	1.0392	0.7206	6
55	0.6936	0.9629	1.0385	0.7203	5
56	0.6938	0.9634	1.0379	0.7201	4
57	0.6940	0.9640	1.0373	0.7199	3
58	0.6942	0.9646	1.0367	0.7197	2
59	0.6944	0.9651	1.0361	0.7195	1
60	0.6947	0.9657	1.0355	0.7193	0
	Cos	Cot	Tan	Sin	′

′	Sin	Tan	Cot	Cos	
0	0.6947	0.9657	1.0355	0.7193	60
1	0.6949	0.9663	1.0349	0.7191	59
2	0.6951	0.9668	1.0343	0.7189	58
3	0.6953	0.9674	1.0337	0.7187	57
4	0.6955	0.9679	1.0331	0.7185	56
5	0.6957	0.9685	1.0325	0.7183	55
6	0.6959	0.9691	1.0319	0.7181	54
7	0.6961	0.9696	1.0313	0.7179	53
8	0.6963	0.9702	1.0307	0.7177	52
9	0.6965	0.9708	1.0301	0.7175	51
10	0.6967	0.9713	1.0295	0.7173	50
11	0.6970	0.9719	1.0289	0.7171	49
12	0.6972	0.9725	1.0283	0.7169	48
13	0.6974	0.9730	1.0277	0.7167	47
14	0.6976	0.9736	1.0271	0.7165	46
15	0.6978	0.9742	1.0265	0.7163	45
16	0.6980	0.9747	1.0259	0.7161	44
17	0.6982	0.9753	1.0253	0.7159	43
18	0.6984	0.9759	1.0247	0.7157	42
19	0.6986	0.9764	1.0241	0.7155	41
20	0.6988	0.9770	1.0235	0.7153	40
21	0.6990	0.9776	1.0230	0.7151	39
22	0.6992	0.9781	1.0224	0.7149	38
23	0.6995	0.9787	1.0218	0.7147	37
24	0.6997	0.9793	1.0212	0.7145	36
25	0.6999	0.9798	1.0206	0.7143	35
26	0.7001	0.9804	1.0200	0.7141	34
27	0.7003	0.9810	1.0194	0.7139	33
28	0.7005	0.9816	1.0188	0.7137	32
29	0.7007	0.9821	1.0182	0.7135	31
30	0.7009	0.9827	1.0176	0.7133	30
31	0.7011	0.9833	1.0170	0.7130	29
32	0.7013	0.9838	1.0164	0.7128	28
33	0.7015	0.9844	1.0158	0.7126	27
34	0.7017	0.9850	1.0152	0.7124	26
35	0.7019	0.9856	1.0147	0.7122	25
36	0.7022	0.9861	1.0141	0.7120	24
37	0.7024	0.9867	1.0135	0.7118	23
38	0.7026	0.9873	1.0129	0.7116	22
39	0.7028	0.9879	1.0123	0.7114	21
40	0.7030	0.9884	1.0117	0.7112	20
41	0.7032	0.9890	1.0111	0.7110	19
42	0.7034	0.9896	1.0105	0.7108	18
43	0.7036	0.9902	1.0099	0.7106	17
44	0.7038	0.9907	1.0094	0.7104	16
45	0.7040	0.9913	1.0088	0.7102	15
46	0.7042	0.9919	1.0082	0.7100	14
47	0.7044	0.9925	1.0076	0.7098	13
48	0.7046	0.9930	1.0070	0.7096	12
49	0.7048	0.9936	1.0064	0.7094	11
50	0.7050	0.9942	1.0058	0.7092	10
51	0.7053	0.9948	1.0052	0.7090	9
52	0.7055	0.9954	1.0047	0.7088	8
53	0.7057	0.9959	1.0041	0.7085	7
54	0.7059	0.9965	1.0035	0.7083	6
55	0.7061	0.9971	1.0029	0.7081	5
56	0.7063	0.9977	1.0023	0.7079	4
57	0.7065	0.9983	1.0017	0.7077	3
58	0.7067	0.9988	1.0012	0.7075	2
59	0.7069	0.9994	1.0006	0.7073	1
60	0.7071	1.0000	1.0000	0.7071	0
	Cos	Cot	Tan	Sin	′

VALUES AND LOGARITHMS OF HAVERSINES

[Characteristics of Logarithms omitted — determine by rule from the value]

0′		10′		20′		30′		40′		50′	
Value	Log$_{10}$	Value	Log$_{10}$	Value	Log$_{10}$	Value	Log$_{10}$	Value	Log$_{10}$	Value	Log$_{10}$
.0000		.0000	4.3254	.0000	4.9275	.0000	5.2796	.0000	5.5295	.0001	5.7223
.0001	5.8817	.0001	6.0156	.0001	6.1315	.0002	.2338	.0002	.3254	.0003	.4081
.0003	.4837	.0004	.5532	.0004	.6176	.0005	.6775	.0005	.7336	.0006	.7862
.0007	.8358	.0008	.8828	.0008	.9273	.0009	.9697	.0010	.0101	.0011	.0487
.0012	.0856	.0013	.1211	.0014	.1551	.0015	.1879	.0017	.2195	.0018	.2499
.0019	.2793	.0020	.3078	.0022	.3354	.0023	.3621	.0024	.3880	.0026	.4132
.0027	.4376	.0029	.4614	.0031	.4845	.0032	.5071	.0034	.5290	.0036	.5504
.0037	.5713	.0039	.5918	.0041	.6117	.0043	.6312	.0045	.6503	.0047	.6689
.0049	.6872	.0051	.7051	.0053	.7226	.0055	.7397	.0057	.7566	.0059	.7731
.0062	.7893	.0064	.8052	.0066	.8208	.0069	.8361	.0071	.8512	.0073	.8660
.0076	.8806	.0079	.8949	.0081	.9090	.0084	.9229	.0086	.9365	.0089	.9499
.0092	.9631	.0095	.9762	.0097	.9890	.0100	.0016	.0103	.0141	.0106	.0264
.0109	.0385	.0112	.0504	.0115	.0622	.0119	.0738	.0122	.0853	.0125	.0966
.0128	.1077	.0131	.1187	.0135	.1296	.0138	.1404	.0142	.1510	.0145	.1614
.0149	.1718	.0152	.1320	.0156	.1921	.0159	.2021	.0163	.2120	.0167	.2218
.0170	.2314	.0174	.2409	.0178	.2504	.0182	.2597	.0186	.2689	.0190	.2781
.0194	.2871	.0198	.2961	.0202	.3049	.0206	.3137	.0210	.3223	.0214	.3309
.0218	.3394	.0223	.3478	.0227	.3561	.0231	.3644	.0236	.3726	.0240	.3806
.0245	.3887	.0249	.3966	.0254	.4045	.0258	.4123	.0263	.4200	.0268	.4276
.0272	.4352	.0277	.4427	.0282	.4502	.0287	.4576	.0292	.4649	.0297	.4721
.0302	.4793	.0307	.4865	.0312	.4936	.0317	.5006	.0322	.5075	.0327	.5144
.0332	.5213	.0337	.5281	.0343	.5348	.0348	.5415	.0353	.5481	.0359	.5547
.0364	.5612	.0370	.5677	.0375	.5741	.0381	.5805	.0386	.5868	.0392	.5931
.0397	.5993	.0403	.6055	.0409	.6116	.0415	.6177	.0421	.6238	.0426	.6298
.0432	.6357	.0438	.6417	.0444	.6476	.0450	.6534	.0456	.6592	.0462	.6650
.0468	.6707	.0475	.6764	.0481	.6820	.0487	.6876	.0493	.6932	.0500	.6987
.0506	.7042	.0512	.7096	.0519	.7151	.0525	.7204	.0532	.7258	.0538	.7311
.0545	.7364	.0552	.7416	.0558	.7468	.0565	.7520	.0572	.7572	.0578	.7623
.0585	.7673	.0592	.7724	.0599	.7774	.0606	.7824	.0613	.7874	.0620	.7923
.0627	.7972	.0634	.8020	.0641	.8069	.0648	.8117	.0655	.8165	.0663	.8213
.0670	.8260	.0677	.8307	.0684	.8354	.0692	.8400	.0699	.8446	.0707	.8492
.0714	.8538	.0722	.8583	.0729	.8629	.0737	.8673	.0744	.8718	.0752	.8763
.0760	.8807	.0767	.8851	.0775	.8894	.0783	.8938	.0791	.8981	.0799	.9024
.0807	.9067	.0815	.9109	.0823	.9152	.0831	.9194	.0839	.9236	.0847	.9277
.0855	.9319	.0863	.9360	.0871	.9401	.0879	.9442	.0888	.9482	.0896	.9523
.0904	.9563	.0913	.9603	.0921	.9643	.0929	.9682	.0938	.9722	.0946	.9761
.0955	.9800	.0963	.9838	.0972	.9877	.0981	.9915	.0989	.9954	.0998	.9992
.1007	.0030	.1016	.0067	.1024	.0105	.1033	.0142	.1042	.0179	.1051	.0216
.1060	.0253	.1069	.0289	.1078	.0326	.1087	.0362	.1096	.0398	.1105	.0434
.1114	.0470	.1123	.0505	.1133	.0541	.1142	.0576	.1151	.0611	.1160	.0646
.1170	.0681	.1179	.0716	.1189	.0750	.1198	.0784	.1207	.0817	.1217	.0853
.1226	.0887	.1236	.0920	.1246	.0954	.1255	.0987	.1265	.1021	.1275	.1054
.1284	.1087	.1294	.1119	.1304	.1152	.1314	.1185	.1323	.1217	.1333	.1249
.1343	.1282	.1353	.1314	.1363	.1345	.1373	.1377	.1383	.1409	.1393	.1440
.1403	.1472	.1413	.1503	.1424	.1534	.1434	.1565	.1444	.1596	.1454	.1626
.1464	.1657	.1475	.1687	.1485	.1718	.1495	.1748	.1506	.1778	.1516	.1808
.1527	.1838	.1538	.1867	.1548	.1897	.1558	.1926	.1569	.1956	.1579	.1985
.1590	.2014	.1600	.2043	.1611	.2072	.1622	.2101	.1633	.2129	.1644	.2158
.1654	.2186	.1665	.2215	.1676	.2243	.1687	.2271	.1698	.2299	.1709	.2327
.1720	.2355	.1731	.2382	.1742	.2410	.1753	.2437	.1764	.2465	.1775	.2492
.1786	.2519	.1797	.2546	.1808	.2573	.1820	.2600	.1831	.2627	.1842	.2653
.1853	.2680	.1865	.2706	.1876	.2732	.1887	.2759	.1899	.2785	.1910	.2811
.1922	.2837	.1933	.2863	.1945	.2888	.1956	.2914	.1968	.2940	.1979	.2965
.1991	.2991	.2003	.3016	.2014	.3041	.2026	.3066	.2038	.3091	.2049	.3116
.2061	.3141	.2073	.3166	.2085	.3190	.2096	.3215	.2108	.3239	.2120	.3264
.2132	.3288	.2144	.3312	.2156	.3336	.2168	.3361	.2180	.3384	.2192	.3408
.2204	.3432	.2216	.3456	.2228	.3480	.2240	.3503	.2252	.3527	.2265	.3550
.2277	.3573	.2289	.3596	.2301	.3620	.2314	.3643	.2326	.3666	.2338	.3689
.2350	.3711	.2363	.3734	.2375	.3757	.2388	.3779	.2400	.3802	.2412	.3824
.2425	.3847	.2437	.3869	.2450	.3891	.2462	.3913	.2475	.3935	.2487	.3957

°	0′		10′		20′		30′		40′		50′	
	Value	$\log_{10}$	Value	$\log_{10}$	Value	$\log_{10}$	Value	$\log_{10}$	Value	$\log_{10}$	Value	$\log_{10}$
60	.2500	.3979	.2513	.4001	.2525	.4023	.2538	.4045	.2551	.4066	.2563	.4088
61	.2576	.4109	.2589	.4131	.2601	.4152	.2614	.4173	.2627	.4195	.2640	.4216
62	.2653	.4237	.2665	.4258	.2678	.4279	.2691	.4300	.2704	.4320	.2717	.4341
63	.2730	.4362	.2743	.4382	.2756	.4403	.2769	.4423	.2782	.4444	.2795	.4464
64	.2808	.4484	.2821	.4504	.2834	.4524	.2847	.4545	.2861	.4565	.2874	.4584
65	.2887	.4604	.2900	.4624	.2913	.4644	.2927	.4664	.2940	.4683	.2953	.4703
66	.2966	.4722	.2980	.4742	.2993	.4761	.3006	.4780	.3020	.4799	.3033	.4819
67	.3046	.4838	.3060	.4857	.3073	.4876	.3087	.4895	.3100	.4914	.3113	.4932
68	.3127	.4951	.3140	.4970	.3154	.4989	.3167	.5007	.3181	.5026	.3195	.5044
69	.3208	.5063	.3222	.5081	.3235	.5099	.3249	.5117	.3263	.5136	.3276	.5154
70	.3290	.5172	.3304	.5190	.3317	.5208	.3331	.5226	.3345	.5244	.3358	.5261
71	.3372	.5279	.3386	.5297	.3400	.5314	.3413	.5332	.3427	.5349	.3441	.5367
72	.3455	.5384	.3469	.5402	.3483	.5419	.3496	.5436	.3510	.5454	.3524	.5471
73	.3538	.5488	.3552	.5505	.3566	.5522	.3580	.5539	.3594	.5556	.3608	.5572
74	.3622	.5589	.3636	.5606	.3650	.5623	.3664	.5639	.3678	.5656	.3692	.5672
75	.3706	.5689	.3720	.5705	.3734	.5722	.3748	.5738	.3762	.5754	.3776	.5771
76	.3790	.5787	.3805	.5803	.3819	.5819	.3833	.5835	.3847	.5851	.3861	.5867
77	.3875	.5883	.3889	.5899	.3904	.5915	.3918	.5930	.3932	.5946	.3946	.5962
78	.3960	.5977	.3975	.5993	.3989	.6009	.4003	.6024	.4017	.6039	.4032	.6055
79	.4046	.6070	.4060	.6085	.4075	.6101	.4089	.6116	.4103	.6131	.4117	.6146
80	.4132	.6161	.4146	.6176	.4160	.6191	.4175	.6206	.4189	.6221	.4203	.6236
81	.4218	.6251	.4232	.6266	.4247	.6280	.4261	.6295	.4275	.6310	.4290	.6324
82	.4304	.6339	.4319	.6353	.4333	.6368	.4347	.6382	.4362	.6397	.4376	.6411
83	.4391	.6425	.4405	.6440	.4420	.6454	.4434	.6468	.4448	.6482	.4463	.6496
84	.4477	.6510	.4492	.6524	.4506	.6538	.4521	.6552	.4535	.6566	.4550	.6580
85	.4564	.6594	.4579	.6607	.4593	.6621	.4608	.6635	.4622	.6649	.4637	.6662
86	.4651	.6676	.4666	.6689	.4680	.6703	.4695	.6716	.4709	.6730	.4724	.6743
87	.4738	.6756	.4753	.6770	.4767	.6783	.4782	.6796	.4796	.6809	.4811	.6822
88	.4826	.6835	.4840	.6848	.4855	.6862	.4869	.6875	.4884	.6887	.4898	.6900
89	.4913	.6913	.4937	.6926	.4942	.6939	.4956	.6952	.4971	.6964	.4985	.6977
90	.5000	.6990	.5015	.7002	.5029	.7015	.5044	.7027	.5058	.7040	.5073	.7052
91	.5087	.7065	.5102	.7077	.5116	.7090	.5131	.7102	.5145	.7114	.5160	.7126
92	.5174	.7139	.5189	.7151	.5204	.7163	.5218	.7175	.5233	.7187	.5247	.7199
93	.5262	.7211	.5276	.7223	.5291	.7235	.5305	.7247	.5320	.7259	.5334	.7271
94	.5349	.7283	.5363	.7294	.5378	.7306	.5392	.7318	.5407	.7329	.5421	.7341
95	.5436	.7353	.5450	.7364	.5465	.7376	.5479	.7387	.5494	.7399	.5508	.7410
96	.5523	.7421	.5537	.7433	.5552	.7444	.5566	.7455	.5580	.7467	.5595	.7478
97	.5609	.7489	.5624	.7500	.5638	.7511	.5653	.7523	.5667	.7534	.5682	.7545
98	.5696	.7556	.5710	.7567	.5725	.7577	.5739	.7588	.5753	.7599	.5768	.7610
99	.5782	.7621	.5797	.7632	.5811	.7642	.5825	.7653	.5840	.7664	.5854	.7674
100	.5868	.7685	.5883	.7696	.5897	.7706	.5911	.7717	.5925	.7727	.5940	.7738
101	.5954	.7748	.5968	.7759	.5983	.7769	.5997	.7779	.6011	.7790	.6025	.7800
102	.6040	.7810	.6054	.7820	.6068	.7830	.6082	.7841	.6096	.7851	.6111	.7861
103	.6125	.7871	.6139	.7881	.6153	.7891	.6167	.7901	.6181	.7911	.6195	.7921
104	.6210	.7931	.6224	.7940	.6238	.7950	.6252	.7960	.6266	.7970	.6280	.7980
105	.6294	.7989	.6308	.7999	.6322	.8009	.6336	.8018	.6350	.8028	.6364	.8037
106	.6378	.8047	.6392	.8056	.6406	.8066	.6420	.8075	.6434	.8085	.6448	.8094
107	.6462	.8104	.6476	.8113	.6490	.8122	.6504	.8131	.6517	.8141	.6531	.8150
108	.6545	.8159	.6559	.8168	.6573	.8177	.6587	.8187	.6600	.8196	.6614	.8205
109	.6628	.8214	.6642	.8223	.6655	.8232	.6669	.8241	.6683	.8250	.6696	.8258
110	.6710	.8267	.6724	.8276	.6737	.8285	.6751	.8294	.6765	.8302	.6778	.8311
111	.6792	.8320	.6805	.8329	.6819	.8337	.6833	.8346	.6846	.8354	.6860	.8363
112	.6873	.8371	.6887	.8380	.6900	.8388	.6913	.8397	.6927	.8405	.6940	.8414
113	.6954	.8422	.6967	.8430	.6980	.8439	.6994	.8447	.7007	.8455	.7020	.8464
114	.7034	.8472	.7047	.8480	.7060	.8488	.7073	.8496	.7087	.8504	.7100	.8513
115	.7113	.8521	.7126	.8529	.7139	.8537	.7153	.8545	.7166	.8553	.7179	.8561
116	.7192	.8568	.7205	.8576	.7218	.8584	.7231	.8592	.7244	.8600	.7257	.8608
117	.7270	.8615	.7283	.8623	.7296	.8631	.7309	.8638	.7322	.8646	.7335	.8654
118	.7347	.8661	.7360	.8669	.7373	.8676	.7386	.8684	.7399	.8691	.7411	.8699
119	.7424	.8706	.7437	.8714	.7449	.8721	.7462	.8729	.7475	.8736	.7487	.8743

	0′		10′		20′		30′		40′		50′	
	Value	Log$_{10}$	Value	Log$_{10}$	Value	Log$_{10}$	Value	Log$_{10}$	Value	Log$_{10}$	Value	Log$_{10}$
0	.7500	.8751	.7513	.8758	.7525	.8765	.7538	.8772	.7550	.8780	.7563	.8787
1	.7575	.8794	.7588	.8801	.7600	.8808	.7612	.8815	.7625	.8822	.7637	.8829
2	.7650	.8836	.7662	.8843	.7674	.8850	.7686	.8857	.7699	.8864	.7711	.8871
3	.7723	.8878	.7735	.8885	.7748	.8892	.7760	.8898	.7772	.8905	.7784	.8912
4	.7796	.8919	.7808	.8925	.7820	.8932	.7832	.8939	.7844	.8945	.7856	.8952
5	.7868	.8959	.7880	.8965	.7892	.8972	.7904	.8978	.7915	.8985	.7927	.8991
6	.7939	.8998	.7951	.9004	.7962	.9010	.7974	.9017	.7986	.9023	.7997	.9030
7	.8009	.9036	.8021	.9042	.8032	.9048	.8044	.9055	.8055	.9061	.8067	.9067
8	.8078	.9073	.8090	.9079	.8101	.9085	.8113	.9092	.8124	.9098	.8135	.9104
9	.8147	.9110	.8158	.9116	.8169	.9122	.8180	.9128	.8192	.9134	.8203	.9140
0	.8214	.9146	.8225	.9151	.8236	.9157	.8247	.9163	.8258	.9169	.8269	.9175
1	.8280	.9180	.8291	.9186	.8302	.9192	.8313	.9198	.8324	.9203	.8335	.9209
2	.8346	.9215	.8356	.9220	.8367	.9226	.8378	.9231	.8389	.9237	.8399	.9242
3	.8410	.9248	.8421	.9253	.8431	.9259	.8442	.9264	.8452	.9270	.8463	.9275
4	.8473	.9281	.8484	.9286	.8494	.9291	.8501	.9297	.8515	.9302	.8525	.9307
5	.8536	.9312	.8546	.9318	.8556	.9323	.8566	.9328	.8576	.9333	.8587	.9338
6	.8597	.9343	.8607	.9348	.8617	.9353	.8627	.9359	.8637	.9364	.8647	.9369
7	.8657	.9374	.8667	.9379	.8677	.9383	.8686	.9388	.8696	.9393	.8706	.9398
8	.8716	.9403	.8725	.9408	.8735	.9413	.8745	.9417	.8754	.9422	.8764	.9427
9	.8774	.9432	.8783	.9436	.8793	.9441	.8802	.9446	.8811	.9450	.8821	.9455
0	.8830	.9460	.8840	.9464	.8849	.9469	.8858	.9473	.8867	.9478	.8877	.9482
1	.8886	.9487	.8895	.9491	.8904	.9496	.8913	.9500	.8922	.9505	.8931	.9509
2	.8940	.9513	.8949	.9518	.8958	.9522	.8967	.9526	.8976	.9531	.8984	.9535
3	.8993	.9539	.9002	.9543	.9011	.9548	.9019	.9552	.9028	.9556	.9037	.9560
4	.9045	.9564	.9054	.9568	.9062	.9572	.9071	.9576	.9079	.9580	.9087	.9584
5	.9096	.9588	.9104	.9592	.9112	.9596	.9121	.9600	.9129	.9604	.9137	.9608
6	.9145	.9612	.9153	.9616	.9161	.9620	.9169	.9623	.9177	.9627	.9185	.9631
7	.9193	.9635	.9201	.9638	.9209	.9642	.9217	.9646	.9225	.9650	.9233	.9653
8	.9240	.9657	.9248	.9660	.9256	.9664	.9263	.9668	.9271	.9671	.9278	.9675
9	.9286	.9678	.9293	.9682	.9301	.9685	.9308	.9689	.9316	.9692	.9323	.9695
0	.9330	.9699	.9337	.9702	.9345	.9706	.9352	.9709	.9359	.9712	.9366	.9716
1	.9373	.9719	.9380	.9722	.9387	.9725	.9394	.9729	.9401	.9732	.9408	.9735
2	.9415	.9738	.9422	.9741	.9428	.9744	.9435	.9747	.9442	.9751	.9448	.9754
3	.9455	.9757	.9462	.9760	.9468	.9763	.9475	.9766	.9481	.9769	.9488	.9772
4	.9494	.9774	.9500	.9777	.9507	.9780	.9513	.9783	.9519	.9786	.9525	.9789
5	.9532	.9792	.9538	.9794	.9544	.9797	.9550	.9800	.9556	.9803	.9562	.9805
6	.9568	.9808	.9574	.9811	.9579	.9813	.9585	.9816	.9591	.9819	.9597	.9821
7	.9603	.9824	.9608	.9826	.9614	.9829	.9619	.9831	.9625	.9834	.9630	.9836
8	.9636	.9839	.9641	.9841	.9647	.9844	.9652	.9846	.9657	.9849	.9663	.9851
9	.9668	.9853	.9673	.9856	.9678	.9858	.9683	.9860	.9688	.9863	.9693	.9865
0	.9698	.9867	.9703	.9869	.9708	.9871	.9713	.9874	.9718	.9876	.9723	.9878
1	.9728	.9880	.9732	.9882	.9737	.9884	.9742	.9886	.9746	.9888	.9751	.9890
2	.9755	.9892	.9760	.9894	.9764	.9896	.9769	.9898	.9773	.9900	.9777	.9902
3	.9782	.9904	.9786	.9906	.9790	.9908	.9794	.9910	.9798	.9911	.9802	.9913
4	.9806	.9915	.9810	.9917	.9814	.9919	.9818	.9920	.9822	.9922	.9826	.9923
5	.9830	.9925	.9833	.9927	.9837	.9929	.9841	.9930	.9844	.9932	.9848	.9933
6	.9851	.9935	.9855	.9937	.9858	.9938	.9862	.9940	.9865	.9941	.9869	.9943
7	.9872	.9944	.9875	.9945	.9878	.9947	.9881	.9948	.9885	.9950	.9888	.9951
8	.9891	.9952	.9894	.9954	.9897	.9955	.9900	.9956	.9903	.9957	.9905	.9959
9	.9908	.9960	.9911	.9961	.9914	.9962	.9916	.9963	.9919	.9965	.9921	.9966
0	.9924	.9967	.9927	.9968	.9929	.9969	.9931	.9970	.9934	.9971	.9936	.9972
1	.9938	.9973	.9941	.9974	.9943	.9975	.9945	.9976	.9947	.9977	.9949	.9978
2	.9951	.9979	.9953	.9980	.9955	.9981	.9957	.9981	.9959	.9982	.9961	.9983
3	.9963	.9984	.9964	.9984	.9966	.9985	.9968	.9986	.9969	.9987	.9971	.9987
4	.9973	.9988	.9974	.9988	.9976	.9989	.9977	.9990	.9978	.9991	.9980	.9991
5	.9981	.9992	.9982	.9992	.9983	.9993	.9985	.9993	.9986	.9994	.9987	.9994
6	.9988	.9995	.9989	.9995	.9990	.9996	.9991	.9996	.9992	.9996	.9992	.9997
7	.9993	.9997	.9994	.9997	.9995	.9998	.9995	.9998	.9996	.9998	.9996	.9998
8	.9997	.9999	.9997	.9999	.9998	.9999	.9998	.9999	.9999	.9999	.9999	.9999
9	.9999	.9999	.9999	.9999	.9999	.9999	.9999	.9999	.9999	.0000	1.0000	.0000

POWERS AND ROOTS

No.	Square	Cube	Square Root	Cube Root	No.	Square	Cube	Square Root	Cube Root
1	1	1	1.000	1.000	51	2 601	132 651	7.141	3.708
2	4	8	1.414	1.260	52	2 704	140 608	7.211	3.733
3	9	27	1.732	1.442	53	2 809	148 877	7.280	3.756
4	16	64	2.000	1.587	54	2 916	157 464	7.348	3.780
5	25	125	2.236	1.710	55	3 025	166 375	7.416	3.803
6	36	216	2.449	1.817	56	3 136	175 616	7.483	3.826
7	49	343	2.646	1.913	57	3 249	185 193	7.550	3.849
8	64	512	2.828	2.000	58	3 364	195 112	7.616	3.871
9	81	729	3.000	2.080	59	3 481	205 379	7.681	3.893
10	100	1 000	3.162	2.154	60	3 600	216 000	7.746	3.915
11	121	1 331	3.317	2.224	61	3 721	226 981	7.810	3.936
12	144	1 728	3.464	2.289	62	3 844	238 328	7.874	3.958
13	169	2 197	3.606	2.351	63	3 969	250 047	7.937	3.979
14	196	2 744	3.742	2.410	64	4 096	262 144	8.000	4.000
15	225	3 375	3.873	2.466	65	4 225	274 625	8.062	4.021
16	256	4 096	4.000	2.520	66	4 356	287 496	8.124	4.041
17	289	4 913	4.123	2.571	67	4 489	300 763	8.185	4.062
18	324	5 832	4.243	2.621	68	4 624	314 432	8.246	4.082
19	361	6 859	4.359	2.668	69	4 761	328 509	8.307	4.102
20	400	8 000	4.472	2.714	70	4 900	343 000	8.367	4.121
21	441	9 261	4.583	2.759	71	5 041	357 911	8.426	4.141
22	484	10 648	4.690	2.802	72	5 184	373 248	8.485	4.160
23	529	12 167	4.796	2.844	73	5 329	389 017	8.544	4.179
24	576	13 824	4.899	2.884	74	5 476	405 224	8.602	4.198
25	625	15 625	5.000	2.924	75	5 625	421 875	8.660	4.217
26	676	17 576	5.099	2.962	76	5 776	438 976	8.718	4.236
27	729	19 683	5.196	3.000	77	5 929	456 533	8.775	4.254
28	784	21 952	5.292	3.037	78	6 084	474 552	8.832	4.273
29	841	24 389	5.385	3.072	79	6 241	493 039	8.888	4.291
30	900	27 000	5.477	3.107	80	6 400	512 000	8.944	4.309
31	961	29 791	5.568	3.141	81	6 561	531 441	9.000	4.327
32	1 024	32 768	5.657	3.175	82	6 724	551 368	9.055	4.344
33	1 089	35 937	5.745	3.208	83	6 889	571 787	9.110	4.362
34	1 156	39 304	5.831	3.240	84	7 056	592 704	9.165	4.380
35	1 225	42 875	5.916	3.271	85	7 225	614 125	9.220	4.397
36	1 296	46 656	6.000	3.302	86	7 396	636 056	9.274	4.414
37	1 369	50 653	6.083	3.332	87	7 569	658 503	9.327	4.431
38	1 444	54 872	6.164	3.362	88	7 744	681 472	9.381	4.448
39	1 521	59 319	6.245	3.391	89	7 921	704 969	9.434	4.465
40	1 600	64 000	6.325	3.420	90	8 100	729 000	9.487	4.481
41	1 681	68 921	6.403	3.448	91	8 281	753 571	9.539	4.498
42	1 764	74 088	6.481	3.476	92	8 464	778 688	9.592	4.514
43	1 849	79 507	6.557	3.503	93	8 649	804 357	9.644	4.531
44	1 936	85 184	6.633	3.530	94	8 836	830 584	9.695	4.547
45	2 025	91 125	6.708	3.557	95	9 025	857 375	9.747	4.563
46	2 116	97 336	6.782	3.583	96	9 216	884 736	9.798	4.579
47	2 209	103 823	6.856	3.609	97	9 409	912 673	9.849	4.595
48	2 304	110 592	6.928	3.634	98	9 604	941 192	9.899	4.610
49	2 401	117 649	7.000	3.659	99	9 801	970 299	9.950	4.626
50	2 500	125 000	7.071	3.684	100	10 000	1 000 000	10.000	4.642

DEGREES, MINUTES AND SECONDS TO RADIANS

1 degree = 0.01745 32925 19943 radians

Degrees					Minutes		Seconds	
0.00000 00	**60°**	1.04719 76	**120°**	2.09439 51	**0**	0.00000 00	**0**	0.00000 00
0.01745 33	61	1.06465 08	121	2.11184 84	1	0.00029 09	1	0.00000 48
0.03490 66	62	1.08210 41	122	2.12930 17	2	0.00058 18	2	0.00000 97
0.05235 99	63	1.09955 74	123	2.14675 50	3	0.00087 27	3	0.00001 45
0.06981 32	64	1.11701 07	124	2.16420 83	4	0.00116 36	4	0.00001 94
0.08726 65	**65**	1.13446 40	**125**	2.18166 16	**5**	0.00145 44	**5**	0.00002 42
0.10471 98	66	1.15191 73	126	2.19911 49	6	0.00174 53	6	0.00002 91
0.12217 30	67	1.16937 06	127	2.21656 82	7	0.00203 62	7	0.00003 39
0.13962 63	68	1.18682 39	128	2.23402 14	8	0.00232 71	8	0.00003 88
0.15707 96	69	1.20427 72	129	2.25147 47	9	0.00261 80	9	0.00004 36
0.17453 29	**70**	1.22173 05	**130**	2.26892 80	**10**	0.00290 89	**10**	0.00004 85
0.19198 62	71	1.23918 38	131	2.28638 13	11	0.00319 98	11	0.00005 33
0.20943 95	72	1.25663 71	132	2.30383 46	12	0.00349 07	12	0.00005 82
0.22689 28	73	1.27409 04	133	2.32128 79	13	0.00378 15	13	0.00006 30
0.24434 61	74	1.29154 36	134	2.33874 12	14	0.00407 24	14	0.00006 79
0.26179 94	**75**	1.30899 69	**135**	2.35619 45	**15**	0.00436 33	**15**	0.00007 27
0.27925 27	76	1.32645 02	136	2.37364 78	16	0.00465 42	16	0.00007 76
0.29670 60	77	1.34390 35	137	2.39110 11	17	0.00494 51	17	0.00008 24
0.31415 93	78	1.36135 68	138	2.40855 44	18	0.00523 60	18	0.00008 73
0.33161 26	79	1.37881 01	139	2.42600 77	19	0.00552 69	19	0.00009 21
0.34906 59	**80**	1.39626 34	**140**	2.44346 10	**20**	0.00581 78	**20**	0.00009 70
0.36651 91	81	1.41371 67	141	2.46091 42	21	0.00610 87	21	0.00010 18
0.38397 24	82	1.43117 00	142	2.47836 75	22	0.00639 95	22	0.00010 67
0.40142 57	83	1.44862 33	143	2.49582 08	23	0.00669 04	23	0.00011 15
0.41887 90	84	1.46607 66	144	2.51327 41	24	0.00698 13	24	0.00011 64
0.43633 23	**85**	1.48352 99	**145**	2.53072 74	**25**	0.00727 22	**25**	0.00012 12
0.45378 56	86	1.50098 32	146	2.54818 07	26	0.00756 31	26	0.00012 61
0.47123 89	87	1.51843 64	147	2.56563 40	27	0.00785 40	27	0.00013 09
0.48869 22	88	1.53588 97	148	2.58308 73	28	0.00814 49	28	0.00013 57
0.50614 55	89	1.55334 30	149	2.60054 06	29	0.00843 58	29	0.00014 06
0.52359 88	**90**	1.57079 63	**150**	2.61799 39	**30**	0.00872 66	**30**	0.00014 54
0.54105 21	91	1.58824 96	151	2.63544 72	31	0.00901 75	31	0.00015 03
0.55850 54	92	1.60570 29	152	2.65290 05	32	0.00930 84	32	0.00015 51
0.57595 87	93	1.62315 62	153	2.67035 38	33	0.00959 93	33	0.00016 00
0.59341 19	94	1.64060 95	154	2.68780 70	34	0.00989 02	34	0.00016 48
0.61086 52	**95**	1.65806 28	**155**	2.70526 03	**35**	0.01018 11	**35**	0.00016 97
0.62831 85	96	1.67551 61	156	2.72271 36	36	0.01047 20	36	0.00017 45
0.64577 18	97	1.69296 94	157	2.74016 69	37	0.01076 29	37	0.00017 94
0.66322 51	98	1.71042 27	158	2.75762 02	38	0.01105 38	38	0.00018 42
0.68067 84	99	1.72787 60	159	2.77507 35	39	0.01134 46	39	0.00018 91
0.69813 17	**100**	1.74532 93	**160**	2.79252 68	**40**	0.01163 55	**40**	0.00019 39
0.71558 50	101	1.76278 25	161	2.80998 01	41	0.01192 64	41	0.00019 88
0.73303 83	102	1.78023 58	162	2.82743 34	42	0.01221 73	42	0.00020 36
0.75049 16	103	1.79768 91	163	2.84488 67	43	0.01250 82	43	0.00020 85
0.76794 49	104	1.81514 24	164	2.86234 00	44	0.01279 91	44	0.00021 33
0.78539 82	**105**	1.83259 57	**165**	2.87979 33	**45**	0.01309 00	**45**	0.00021 82
0.80285 15	106	1.85004 90	166	2.89724 66	46	0.01338 09	46	0.00022 30
0.82030 47	107	1.86750 23	167	2.91469 99	47	0.01367 17	47	0.00022 79
0.83775 80	108	1.88495 56	168	2.93215 31	48	0.01396 26	48	0.00023 27
0.85521 13	109	1.90240 89	169	2.94960 64	49	0.01425 35	49	0.00023 76
0.87266 46	**110**	1.91986 22	**170**	2.96705 97	**50**	0.01454 44	**50**	0.00024 24
0.89011 79	111	1.93731 55	171	2.98451 30	51	0.01483 53	51	0.00024 73
0.90757 12	112	1.95476 88	172	3.00196 63	52	0.01512 62	52	0.00025 21
0.92502 45	113	1.97222 21	173	3.01941 96	53	0.01541 71	53	0.00025 70
0.94247 78	114	1.98967 53	174	3.03687 29	54	0.01570 80	54	0.00026 18
0.95993 11	**115**	2.00712 86	**175**	3.05432 62	**55**	0.01599 89	**55**	0.00026 66
0.97738 44	116	2.02458 19	176	3.07177 95	56	0.01628 97	56	0.00027 15
0.99483 77	117	2.04203 52	177	3.08923 28	57	0.01658 06	57	0.00027 63
1.01229 10	118	2.05948 85	178	3.10668 61	58	0.01687 15	58	0.00028 12
1.02974 43	119	2.07694 18	179	3.12413 94	59	0.01716 24	59	0.00028 60
1.04719 76	**120**	2.09439 51	**180**	3.14159 27	**60**	0.01745 33	**60**	0.00029 09

RADIANS TO DEGREES

	Radians	Tenths	Hundredths	Thousandths	Ten thousandths
1	57°17′44″.8	5°43′46″.5	0°34′22″.6	0° 3′26″.3	0° 0′20″.6
2	114°35′29″.6	11°27′33″.0	1° 8′45″.3	0° 6′53″.5	0° 0′41″.3
3	171°53′14″.4	17°11′19″.4	1°43′07″.9	0°10′18″.8	0° 1′01″.9
4	229°10′59″.2	22°55′05″.9	2°17′30″.6	0°13′45″.1	0° 1′22″.5
5	286°28′44″.0	28°38′52″.4	2°51′53″.2	0°17′11″.3	0° 1′43″.1
6	343°46′28″.8	34°22′38″.9	3°26′15″.9	0°20′37″.6	0° 2′03″.8
7	401° 4′13″.6	40° 6′25″.4	4° 0′38″.5	0°24′03″.9	0° 2′24″.4
8	458°21′58″.4	45°50′11″.8	4°35′01″.2	0°27′30″.1	0° 2′45″.0
9	515°39′43″.3	51°33′58″.3	5° 9′23″.8	0°30′56″.4	0° 3′05″.6

TABLE OF CONSTANTS

VALUES		RECIPROCALS	
π	3.14159 26535 89793	$\frac{1}{\pi}$	0.31830 98861 83791
$\frac{\pi}{2}$	1.57079 63267 94897	$\frac{2}{\pi}$	0.63661 97723 67582
2π	6.28318 53071 79586	$\frac{1}{2\pi}$	0.15915 49430 91895
π^2	9.86960 44010 89359	$\frac{1}{\pi^2}$	0.10132 11836 42338
$\sqrt{\pi}$	1.77245 38509 05516	$\frac{1}{\sqrt{\pi}}$	0.56418 95835 47756
$\sqrt{\frac{\pi}{2}}$	1.25331 41373 15500	$\sqrt{\frac{2}{\pi}}$	0.79788 45608 02865
$\sqrt{2\pi}$	2.50622 82746 31001	$\frac{1}{\sqrt{2\pi}}$	0.39894 22804 01433
e	2.71828 18284 59045	$\frac{1}{e}$	0.36787 94411 71442
e^2	7.38905 60989 30650	$\frac{1}{e^2}$	0.13533 52832 36613
$\sqrt{e}$	1.64872 12707 00128	$\frac{1}{\sqrt{e}}$	0.60653 06597 36613
$\log 10^e$	0.43429 44819 03252	$\log_e 10$	2.30258 50929 94046