OM

A method for finding Logarithms and Antilogarithms.

And

A method for finding Trigonometric values and Inverse values

by

Radhakrishnan.J.

Chennai

Tamilnadu

India.

A method for finding Logarithms and Antilogarithms.

I have an idea for finding logarithms and antilogarithms values. This method is an easy one. I hope you like this method. Your suggestions are welcome. Email id; emmaths@gmail.com. Please visit www.rkmath.yolasite.com. Thank you.

Example-1

Find logarithm of the number17 of base 10.

17 = 1.7×10

Square the number 1.7 continuously for 16 times as shown below.

1) 1.7
2) 2.89
3) 8.3521
4) 6.97575744×10
5) 4.86611918×10^{3}
6) 2.36791158×10^{7}
7) 5.60700525×10^{14}
8) 3.14385078×10^{29}
9) 9.88379772×10^{58}
10) 9.76894573×10^{117}
11) 9.54323006×10^{235}
12) 9.10732399×10^{471}
13) 8.29433502×10^{943}
14) $6.87959934\times10^{1887}$
15) $4.73288870\times10^{3775}$
16) $2.24002354\times 10^{7551}$
17) $5.01770545 \times 10^{15102}$

$1.7^{2^{\wedge}16}$ = $5.01770545 \times 10^{15102}$

= $10^{n} \times 10^{15102}$

Substitute n with any value between 0 and 1.

Take n = 0.5

$5.01770545 \times 10^{15102}$ = $10^{0.5} \times 10^{15102} \pm$error

$1.7^{2^{\wedge}16}$ = $10^{15102.5} \pm$error

1.7 = $10^{15102.5/2^{\wedge}16}$ (approximately)

(2^{16} = 256×256 = 65536)

1.7 = $10^{15102.5/(256\times256)}$ (approximately)

1.7 = $10^{0.230445861}$(approximately)

Logarithm of 1.7 (base10) = 0.2304 (correct up to 4 decimal)

Logarithm of 17 (base10) = 1.2304 (correct up to 4 decimal)

Increasing number of steps gives more accuracy.

The all steps can be written as

$1.7^{2^{\wedge}16}$ = $5.01770545 \times 10^{15102}$

$1.7^{2^{\wedge}16}$ -- $10^{15102+0.5}$

1.7 = $10^{15102.5/2^{\wedge}16}$ (approximately)

1.7 = $10^{0.230445861}$(approximately)

Logarithm of 17 (base10) = 1.2304(correct up to 4 decimal)

Basic behind this method.

When we assume a value, the error is not more than 100%.

Answer = correct value ± error 100%.

When we divide the above value by 2^{16} (=65536), the error becomes too small and the answer now is correct up to 4 decimals.

If we are able to give very close value, the number of steps will decrease accordingly.

So 7 or 8 steps are enough to get correct answer up to 4 decimals.

Example – 2

Find antilogarithm of 0.1234 (base 10)

$10^{0.1234}$

Multiply the power by 2^{16} times (2^{16} times =256×256=65536)

$10^{0.1234\times 2\wedge 16} = 10^{0.1234\times 256\times 256}$

$10^{8087.1424} = 10^{8087}\times 10^{0.1424} = 10^{8087}\times n$

Substitute n by any value between 1 and 10.

Take n as 4.

$10^{8087}\times 10^{0.1424} = 10^{8087}\times 4 \pm \text{error}$

$10^{8087}\times 4.0 = 10^{8086}\times 40 \pm \text{error}$

Take square root continuously for 16 times as shown.

1) $10^{8086}\times40$
2) $10^{4043}\times6.32455532$
3) $10^{2021}\times7.95270728$
4) $10^{1010}\times8.91779528$
5) $10^{505}\times2.98626778$
6) $10^{252}\times5.46467545$
7) $10^{126}\times2.33766452$
8) $10^{63}\times1.52894228$
9) $10^{31}\times3.91016915$
10) $10^{15}\times6.25313453$
11) $10^{7}\times7.90767635$
12) $10^{3}\times8.89251165$
13) $10^{1}\times9.43001147$
14) 9.71082461
15) 3.11621960
16) 1.76528173
17) 1.32863905

Antilogarithm of 0.1234 = 1.3286 (correct up to 4degits.)

All steps can be written as;

$10^{0.1234\times2^{16}}$ -- $10^{8087.1424}$

$10^{8087.1424}$ -- $10^{8086}\times40$

$10^{0.1234}$ = $(10^{8086}\times40)^{1/2^{16}}$(approximately) =1.32863905(approximately)

Antilogarithm of 0.1234 = 1.3286 (correct up to 4 decimals.)

Example-3

Find the logarithm of 9 of base 2.

$9 = 2^3\times1.125$

Finding logarithm of 1.125

Square 1.125 continuously for16 times.

1) 1.125
2) 1.265625
3) 1.60180664
4) 2.56578451
5) 6.58325015
6) 4.3339825×10
7) 1.87828473×10^3
8) 3.52795352×10^6

9)1.24464560×10^{13}

10)1.54914266×10^{26}

11) 2.39984298×10^{52}

12) 5.75924632×10^{104}

13) 3.31689181×10^{209}

14) 1.10017712×10^{419}

15) 1.21038969×10^{838}

16) $1.46504320\times10^{1676}$

17) $2.14635157\times10^{3352}$

$1.125^{2\wedge16}=2.14635157\times10^{3352}$

$10^{3352}=2^{3352\ \times\ 3.322}$ (since $10=2^{3.322}$)

$10^{3352}=2^{11135.344}$

$2.14635157\times10^{3352} = 2\times 2^{n}\times 2^{11135.344}$

Substitute n with any value between 0 and 1.

Assume n = 0.5

$2.14635157\times10^{3352}= 2 \times 2^{0.5} \times 2^{11135.344} \pm\text{error}$

$=2^{11136.844}\pm\text{error}$

$1.125^{2\wedge16} = 2^{11136.844}\pm\text{error}$

$1.125 = 2^{11136.844/2\wedge16}$(approximately)

$1.125 =2^{11136.844/256\times256}$(approximately)

$= 2^{0.16995764}$(approximately)

$1.125 =2^{0.1700}$(correct up to 4 decimals)

$9 =2^{3}\times1.125$

$=2^3 \times 2^{0.1700}$

Logarithms of 9 (base 2) = 3.1700 (correct up to 4 decimals.)

Example -4

Find antilogarithm of 0.7172 of base 2.

Multiply the power by 2^{16} times (2^{16} times =256×256=65536)

$2^{0.7172\times2\hat{}16} = 2^{47002.4192}$

$2^{47002.4192} = 2^{47002} \times 2^{0.4192}$

$2^{47002} \times 2^{0.4192} = 2^{47002} \times n$

n must be between 1 to 2.

Assume any number between 1 and 2.

Take it as 1.414

$2^{47002.4192} = 2^{47002} \times 1.414 \pm \text{error}$

Take square root for 16 times continuously.

1) $2^{47002} \times 1.4142$
2) $2^{23501} \times 1.18920141$
3) $2^{11750} \times 1.54220712$
4) $2^{5875} \times 1.24185632$
5) $2^{2937} \times 1.57597989$
6) $2^{1468} \times 1.77537595$
7) $2^{734} \times 1.33243234$
8) $2^{367} \times 1.15431033$
9) $2^{183} \times 1.51941457$
10) $2^{91} \times 1.74322377$
11) $2^{45} \times 1.86720313$

12) $2^{22} \times 1.93246119$
13) $2^{11} \times 1.39012991$
14) $2^{5} \times 1.66741111$
15) $2^{2} \times 1.82614956$
16) 2×1.35135101
17) 1.64398966

So,

$2^{0.7172}$=1.64398966(approximately)

Antilogarithm of 0.7172 (base 2) = 1.6440 (correct up to 4 decimals.)

To get more accuracy increase number of steps.

Continues in NEXT PAGE

A method

for finding Trigonometric and Inverse values

This is a new way of finding trigonometric values. This is an easy method. I hope it is useful. Your suggestions are welcome. Email id; emmaths@gmail.com. Please visit www.rkmath.yolasite.com. Thank you.

Example -1

Find the value of sin49.15degree.
Sin49.15 degree = cos40.85 degree

Double the cos40.85 degree continuously for16 times as shown below. If the degree exceeds 90^0, use this formula, **180-2×A$^{\mathbf{0}}$**. After 16 times, cos40.85 becomes cos5.6^0. Give any value to cos5.6^0 between 0 and 1. Take it as 0.7071.

Now halve the values continuously for 16 times, corresponding to their degree values using the formula $\frac{\sqrt{1 \pm \cos A/2}}{2}$. Use + sign below 45^0 .Use – sign above 45^0 .

(At the end the answer is arrived, correct up to 4 decimal.Cos40.85 ^{0} = 0.7564.So Sin49.15 = 0.7564. **<u>To get more accuracy increase number of steps.</u>)**

START HERE	FINISH HERE
1) Cos40.85^0	0.75641768 (Answer approximately)
2) 81.7	0.14433544
3) 16.6 (180^0-2×81.7^0=16.6^0)	0.95833456
4) 33.2	0.83681027
5) 66.4	0.40050287
6) 47.2	0.67919489
7) 85.6	0.07738859
8) 8.8	0.98802201
9) 17.6	0.95237499
10) 35.2	0.81403628
11) 70.4	0.32531015
12) 39.2	0.78834661
13) 78.4	0.24298077
14) 23.2	0.88192069 ($\frac{\sqrt{1+0.55556824}}{2}$ = 0.88192069)
15) 46.4	0.55556824
16) 87.2	0.38268786 ($\frac{\sqrt{1-0.7071}}{2}$ = 0.38268786)
17) cos5.6^0	0.7071
<u>Finish here.</u>	**<u>Start here.</u>**

(You can put any value between 0 and 1.)

Basic behind this method.

When we assume a value, the error is not more than 100%.

Answer = correct value ± error 100%.

When we divide the above value by 2^{16} (=65536), the error becomes too small and the answer now is correct up to 4 decimals. If we are able to give a close value, the number of steps will decrease accordingly. So 7 or 8 steps are enough to get correct answer up to 4 decimals.

For example,Cos20.08^0 = ?

Cos79.52^0 = 0.1746(approximately)

(This is calculated by an easy approximate method and the error is always less than 0.5^0. You can use your own easy method.)

(At the end the answer is cos20.08^0 = 0.9392 correct answer up to 4 decimals.)

1) Cos20.08^0 ↓	↑ 0.93922400 (Answer approximately)
2)40.16	0.76428345
3)80.32	0.16825840
4)19.36	0.94337822
5)38.72	0.77992494
6)77.44	0.21656584
7)25.12	0.90619847
8)50.24	0.64239136
9)79.52 →	0.1746

Example -2

Find the degree of $\cos^{-1} 0.2585$.

Double the given value continuously for 16 times, using the formula **$2\cos^2 A - 1$.** Neglect minus sign.

Now the value becomes 0.17703999. Assume any degree between 0 and 90 for 0.17703999. Take it as 45^0 .

Now halve the degree continuously for16 times.

If the corresponding degree value is less than 0.7071(=1/√2), Use this formula **$(180-A^0)/2$.**

If the corresponding degree value is more than 0.7071(1/√2), simply divide by 2.

(At last we get the answer which is correct up to 4 integers.$\cos^{-1} 0.2585$ = 75.02^0)

START HERE	FINISH HERE
1) 0.2585	75.01945^0
$(2\times0.2585^2 - 1 = -0.8663555)$	(Answer approximately)
2) 0.8663555	29.61090
$(2\times0.8663555^2 - 1 = 0.50114370)$	
3) 0.50114370	59.92218
4) 0.49770998	60.15568
5) 0.50456955	59.68872
6) 0.49081913	60.62255
7) 0.51819316	58.75488
8) 0.46295169	62.49
9) 0.57135146	55.01953
10) 0.34711501	69.96093
11) 0.75902233	40.07812
12) 0.15222979	80.15625
13) 0.95365218	19.6875
14) 0.81890496	39.375
	(78.75/2=39.375)
15) 0.34121066	78.75
16) 0.76715057	22.5
	[(180-45)/2 = 22.5]
17) 0.17703999	45^0
Finish here.	**Start here.**

(You can put any value between 0^0 and 90^0.)

18/7/2011.

------------------------\\\\\\\\\\\\----------------------------------