4.7 Evaluating Logarithms

Label the components of Logarithms and Exponents:

$\log_B A = E$ (result, base, argument)

$A = B^E$ (answer, exponent, base)

* "The Seven Rule":

In order to write any logarithm in its corresponding exponential form, you can use the rule of seven to remember the form.

$\log_B A = E$ $\quad B^E = A$

$B^E = A$ $\quad \log_B A = E$

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$\log_B A = E$ $A = B^E$

Ex.) Change the follow from exponents to logs:

a) $2^x = 8$ $\log_2 8 = x$ "log base 2 of 8 equals x."

b) $a^3 = 27$ $\log_a 27 = 3$

c) $4^x = 64$ $\log_4 64 = x$ $\frac{\log(64)}{\log(4)}$

d) $3^x = 1/9$ $\log_3 (1/9) = x$

e) $5^x = 100$ $\log_5 100 = x$

(exact value vs. approximate value)

$\log_5 100$ 2.86

Ex.) Change the following logarithms to exponents:

a) $\log_2 8 = x$ $2^x = 8$

b) $\log_2 x = 10$ $2^{10} = x$

c) $\log_x y = z$ $x^z = y$

Calculating Logarithms on the calculator:

TI-NSpire/TI-84 calculators allow you to put any base in your calculator.

TI-83's always do a base of 10. If you need to calculate a log that has a base other than 10 you must do a "change of base."

ie. $\log_2 3 = \frac{\log 3}{\log 2}$

base to bottom

$\log_b c = \frac{\log_a c}{\log_a b}$

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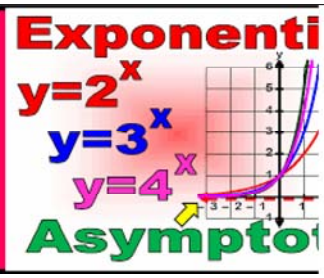
Unit 2

Exponents and Logarithms



Ex.) Solve:

a) $\log_5 125 = x$

$x = 3$

b) $\log_2 16 = x$

$x = 4$

c) $x = \log_{10} 10000$

$x = 4$

Evaluate:

d) $\log_2(1/64)$

$= -6$

e) $\log_3 1$

$= 0$

f) $\log_4 64$

$= 3$

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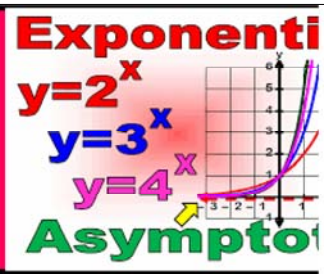
Unit 2

Exponents and Logarithms



A logarithm with a base of *e* is called the natural logarithm.

$y = \log_e x$ $y = \ln x$ $x = e^y$

$y = \log_e x$

e = 2.718281828... is an irrational number, like pi, called *Euler's number.* All rules for logarithms still apply to natural logs.

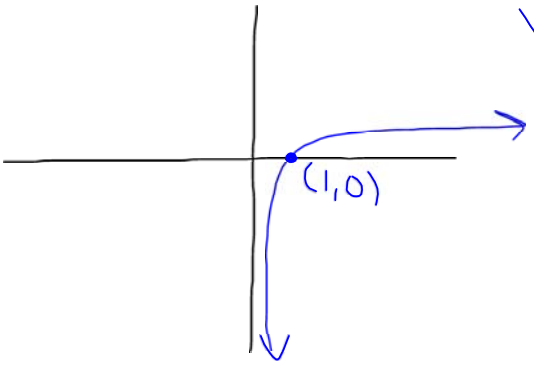
Ex.) Convert the following to exponential form.

a) $y = \ln x$ b) $y = \ln e$

$y = \log_e x$ $y = \log_e e$

$e^y = x$ $e^y = e^1$ $y = 1$

Ex.) Determine the characteristics(intercepts, end behaviour, domain, and range) of y = ln x.



Vertical Asymptote: $x = 0$

Y-int: none

X-int: (1,0)

End Behaviour: IV → I #1-8

Domain: $x > 0$

Range: $y \in \mathbb{R}$

Pg. 436 # 1-8, 11.