

5-5
Logarithmic Functions

Remember:

$$\log_b x = a \text{ if and only if } b^a = x$$

Example 1: Rewrite in log form

$$2^5 = 32$$

$$\log_2 32 = 5$$

Example 2: Rewrite in exponential form

$$\log_5 25 = 2$$

$$5^2 = 25$$

Example 3: Find each logarithm w/o a calculator

a) $\log_4 1/16 = x$

$$4^x = \frac{1}{16}$$

$$-2$$

b. $\log_9 3 = x$

$$9^x = 3$$

$$x = \frac{1}{2}$$

Common Log- log base 10 written
 $\log x$

Example 4:

$$\log 100 = x$$

$$10^x = 100$$

$x = 2$

Natural log- log base e written
 $\ln x$

$$\log 10^4 = x$$

$$10^x = 10^4$$

$x = 4$

Example 5: Using a calculator evaluate

a) $\log 572$

$$2.76$$

b) $\ln 2.718$

$$1$$

c) $\ln 200$

$$5.3$$

d) $\ln e^{16}$

$$16$$

Example: Given $\log 4.17 = 0.6201$, find $\log 417$.

$$10^2 \cdot 10^{0.6201} = 4.17 \cdot 10^2$$

$$10^{2.6201} = 417$$

$$\log 417 = 2.6201$$

$$\log 417$$

$$10^{-1} \cdot 10^{0.6201}$$

$$10^{-0.3799}$$

Example 6: Solve for x.

a) $10^x = 5$

$$\log 5 = x$$

$$10^{\underline{.69897}} = 5$$

b) $e^x = 7$

$$\ln 7 = x$$

$$\underline{1.9459}$$

$$e^{1.9459} = 7$$

c) $\log x = 4$

$$10^4 = x$$

$$10,000 = x$$

d) $\ln x = 4$

$$e^x = x$$

$$54.6$$

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