Evaluating Logarithms

Dec 5/2018

$$y = \log_a x$$
 is equivalent to $x = a^y$

For many problems, we can obtain an exact value by switching between these equivalent expressions and looking for a common base.

There are also some general rules we can develop.

Ex.1 Solve

(a)
$$y = log_3 3^2$$
 (b) $y = log_4 4^7$

$$y = log_4 x$$

$$x = a^4$$

$$\Rightarrow y = 7$$

Nov 27-7:50 PM

In general: $log_a a^x = x$ (1)

Ex.2 Evaluate:

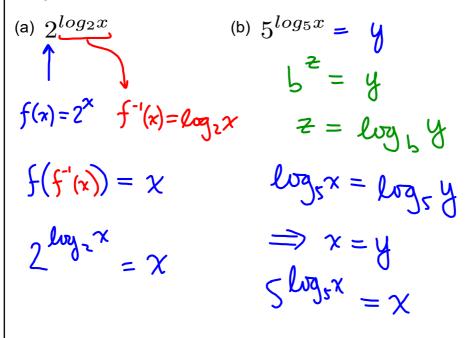
(a)
$$log_{10}(1)$$
 (b) $log_{5}(1)$

$$= log_{10} lo^{9} = log_{5} 5^{9}$$

$$= 0 = 0$$

In general:
$$log_a 1 = 0$$
 (2)

Ex.3 Evaluate:



Dec 1-7:22 PM

In general:
$$a^{log_a x} = x$$
 (3)

What if no common base is possible, and these general rules cannot be applied?

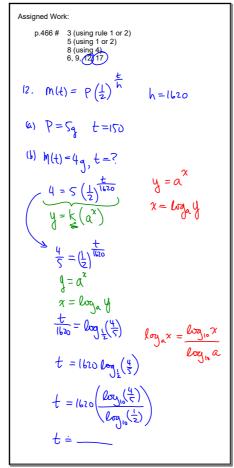
Recall: Many calculators only allow for a base of 10 or 'e'.

$$y = \log_{10} x$$
 or $y = \ln x$

For different bases, we can still calculate the value of a logarithm by using an equivalent expression.

$$\log_a x = \frac{\log_{10} x}{\log_{10} a} \tag{4}$$

Note: we will derive this in our lesson on "laws of logarithms"



Nov 27-8:36 PM