Mar. 8, 2017

Sect. 5-5

Solving Log & Exp Eqns.

Solve:

$2^x = 16$

$x = 4$

$\log 1000 = x$

$x = 3$

Solve:

$10^x = 215$

$\log_{10} 215 = x$

$x \approx 2.\_\_$

$x = \boxed{\log} 215$

$x \approx 2.33$

$e^x = 35$

$\log_e 35 = x$

$x = \ln 35$

$x = \boxed{\ln} 35$

$x \approx 3.55$

$3^x = 17$ $x \approx 2.$—

$\log_3 17 = x$

$\boxed{\log_3}$?

Base-Change Formula

$$\log_b a = \frac{\log_c a}{\log_c b}$$

where c is a convienent base

like 10 or e

$$\log_b a = \frac{\boxed{\log} a}{\boxed{\log} b} = \frac{\boxed{\ln} a}{\boxed{\ln} b}$$

$3^x = 17 \quad x = 2.\overline{}$

$\log_3 17 = x$

$$x = \frac{\log 17}{\log 3}$$

TI: log 17) ÷ log 3) Enter

iPhone: 17 log ÷ 3 log =

$x \approx 2.57$

$$\frac{3(2^x)}{3} = \frac{42}{3}$$

$$2^x = 14$$

$$\log_2 14 = x$$

$$x = \frac{\ln 14}{\ln 2}$$

$$x \approx 3.81$$

$$2(3^{2t-5}) - 4 = 11$$

$$2(3^{2t-5}) = 15$$

$$3^{2t-5} = 7.5$$

$$\log_3 7.5 = 2t - 5$$

$$2t - 5 \approx 1.834$$

$$2t \approx 6.834$$

$$t \approx 3.417$$

$$e^{2x} - 3e^x + 2 = 0$$

$$y^2 - 3y + 2 = 0$$

$$(y-2)(y-1) = 0$$

$y - 2 = 0$ $\quad$ $y - 1 = 0$

$y = 2$ $\quad$ $y = 1$

$e^x = 2$ $\quad$ $e^x = 1$

$x = \ln 2$ $\quad$ $x = 0$

$x \approx 0.693$

Solve: $\log_5(5x-1) = \log_5(x+7)$

$5x - 1 = x + 7$

$4x = 8$

$x = 2$ ✳ Maybe

✓

$$\ln x = 2$$

$$\log_e x = 2$$

$$e^2 = x$$

$$x \approx 7.389$$ * Maybe

✓

$$\log_{10} 5x + \log_{10}(x-1) = 2$$

$$\log_{10}[5x(x-1)] = 2$$

$$10^2 = 5x(x-1)$$

$$100 = 5x^2 - 5x$$

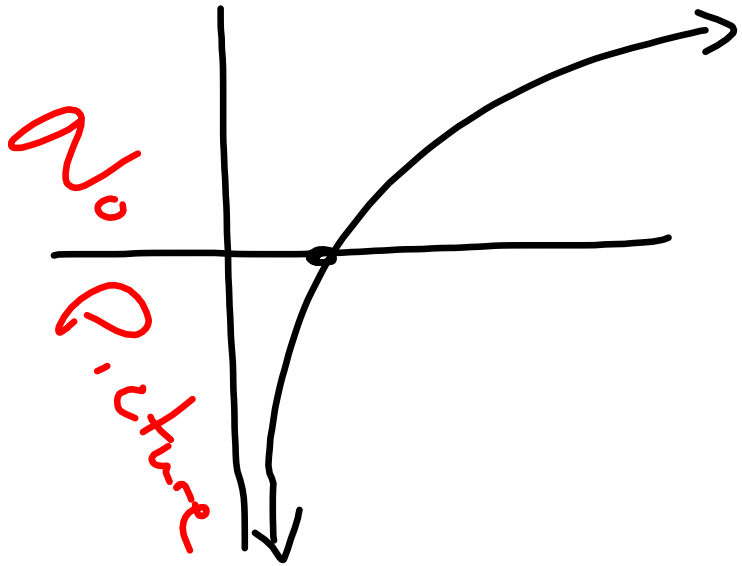
$$x^2 - x - 20 = 0$$

$$x^2 - x - 20 = 0$$

$$(x-5)(x+4) = 0$$

$x = 5$ or ~~$x = -4$~~ Maybe

* Why?



Can not take the log of a negative number.

$$\ln(x+5) = \ln(x-1) - \ln(x+1)$$

$$\ln(x+5) = \ln\left(\frac{x-1}{x+1}\right)$$

$$\frac{x+5}{1} \neq \frac{x-1}{x+1}$$

$$x-1 = (x+5)(x+1)$$

$$x^2+6x+5 = x-1$$

$$x^2+5x+6 = 0$$

$$x^2 + 5x + 6 = 0$$

$$(x+3)(x+2) = 0$$

$x = -3$ $x = -2$

No Sol.