

Nov. 14, 2018

Sect. 6 - 4

Solving Exp. & Log Eqns.

Set Up

Solve

Solve: $2^x = 16$

$$x = 4$$

$$10^x = 215$$
$$x = 2. \underline{\quad}$$
$$\log_{10} 215 = x$$
$$x = \boxed{\log} 215$$
$$x \approx 2.33$$

$$e^x = 35$$
$$\log_e 35 = x$$
$$x = \ln 35$$
$$x = \boxed{\ln} 35$$
$$x \approx 3.55$$

$$3^x = 17$$

$$x = 2. \underline{\hspace{1cm}}$$

$$\log_3 17 = x$$

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

$$x \approx 2.57$$

Base-Change Formula

$$\log_b a = \frac{\log_c a}{\log_c b} \quad \text{where } c \text{ is a "convenient" base}$$

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

$$\begin{aligned}
 e^x + 5 &= 60 \\
 e^x &= 55 \\
 \log_e 55 &= x \\
 x &= \ln 55 \\
 x &= \boxed{\ln} 55 \\
 x &\approx 4.007
 \end{aligned}$$

$$\begin{aligned}
 2(3^{2x-5}) - 4 &= 11 \\
 2(3^{2x-5}) &= 15 \\
 3^{2x-5} &= 7.5 \\
 \log_3 7.5 &= 2x - 5 \\
 2x - 5 &= \frac{\boxed{\log_3} 7.5}{\boxed{\log_3} 3} \\
 2x - 5 &\approx 1.834 \\
 2x &\approx 6.834 \\
 x &\approx 3.417
 \end{aligned}$$

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

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

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

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

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

$$\log_e 2 = x$$

$$\log_e 1 = x$$

$$x = \ln 2$$

$$x = 0$$

$$x \approx 0.69$$

$$\text{Solve: } \log_{10} 1000 = x$$

$$x = 3$$

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

$$5x-1 = x+7$$

$$4x = 8$$

$$x = 2 *$$



$$\ln x = 2$$

$$\log_e x = 2$$

$$e^2 = x$$

$$x \approx 7.389^*$$

✓

$$\boxed{\ln}^{e^x} \quad \boxed{e^x}^{\ln}$$

$$\log_5 5x + \log_5(x-1) = 2$$

$$\log_5 [5x(x-1)] = 2$$

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

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

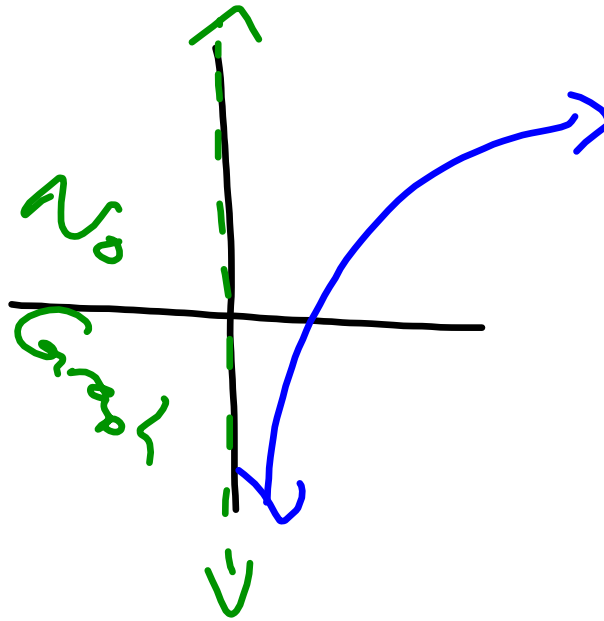
$$5x^2 - 5x - 100 = 0$$

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

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

$$x = 5 \quad x = -4$$

*
✓*
~~-20~~



No
 x_0 (neg #)

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

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

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

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

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

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

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

$$x = -2 \quad *$$

$$x = -3 \quad *$$

No
Sol.