

Friday - Week 7

Set 5 #5

Hint: $\log_6 3 \frac{1}{2} \log_6 2$

$$18 = 6 \cdot 3$$

$$6 \sqrt[6]{108} = \frac{6}{48} \Rightarrow 108 = 6 \cdot 6 \cdot 3 = 6^2 \cdot 3$$

$$x = \frac{7}{13} (\log_6 \sqrt{108} - 3 \log_6 (\frac{2}{\sqrt{3}}) + 3 \log_6 9 + \log_6 2048)$$

$$\log \frac{A}{B} = \log A - \log B$$

$$= \frac{7}{13} \left[\frac{1}{2} \log_6 (6^2 \cdot 3) - 3 \left[\log_6 2 - \log_6 3^{\frac{1}{2}} \right] + 3 \log_6 3^2 + \log_6 2^{11} \right]$$

$$= \frac{7}{13} \left[\frac{1}{2} (2 \log_6 6 + \log_6 3) - 3 \left[\log_6 2 - \frac{1}{2} \log_6 3 \right] + 6 \log_6 3 + 11 \log_6 2 \right]$$

$$= \frac{7}{13} \left[1 + \frac{1}{2} \log_6 3 - 3 \log_6 2 + \frac{3}{2} \log_6 3 + 6 \log_6 3 + 11 \log_6 2 \right]$$

$\log A \cdot B = \log A + \log B$

$$\frac{7}{13} \left[8 \log_6 3 + 8 \log_6 2 + 1 \right] = \frac{7}{13} \left[8 \log_6 (3 \cdot 2) + 1 \right]$$

$$8 (\log_6 3 + \log_6 2)$$

$$8 \log_6 (3 \cdot 2)$$

$$8 \log_6 (6) = 8$$

$$= \frac{7}{13} (8 + 1) = \frac{7}{13} (9) = \frac{63}{13}$$

Set: 4, #15

Solve:

$$16 - \ln(5-x) = 0$$

$$16 = \ln(5-x)$$

$$e^{16} = \frac{\ln(5-x)}{e}$$

$$e^{16} = 5-x$$

$$x = 5 - \underbrace{e^{16}}_{\text{very neg}}$$

isolate log

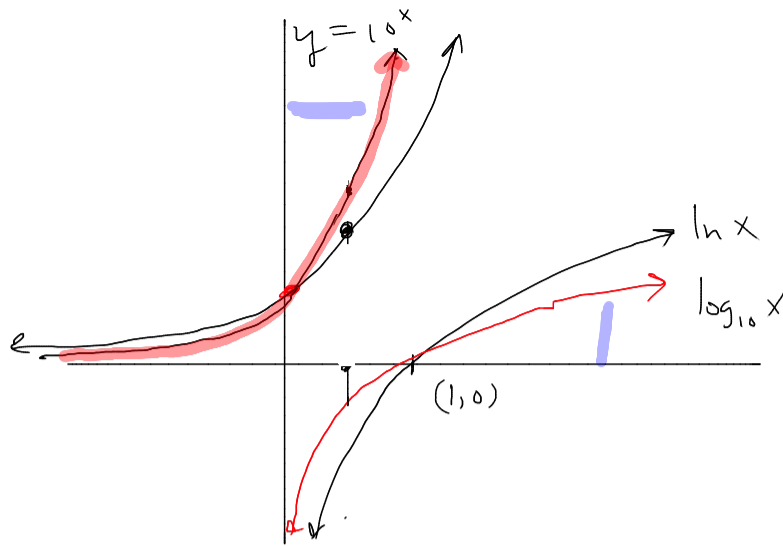
hit w/ inverse function
(exp.)

$$e^{(\ln(765))} = 765$$

$$\ln(e^{765}) = 765$$

check:

$$16 - \ln(5 - (5 - e^{16})) = 16 - \ln(e^{16}) = 16 - 16 = 0 \quad \checkmark$$



$$y = e^x$$

($e \approx 2.7$)

let $a > 1$

$f(x) = \frac{a^x - 1}{x}$, when $x \rightarrow 0$ this fraction approaches some constant

$$\frac{a^0 - 1}{0} = \frac{1 - 1}{0} = \frac{0}{0} = ?$$

e is the base that makes this fraction $\rightarrow 1$

Significance of e ?

$$1000 \left(1 + \frac{.05}{365} \right)^{x \cdot 365} \rightarrow \infty$$

$\rightarrow e$

Set 4 #11

$$10^{3x-7} = 7^{6x-10}$$

↓ ln

$$\ln 10^{(3x-7)} = \ln 7^{(6x-10)}$$

$$(3x-7)\ln 10 = (6x-10)\ln 7$$

$$3x \ln 10 - 7 \ln 10 = 6x \ln 7 - 10 \ln 7$$

$$(3 \ln 10)x - 7 \ln 10 = (6 \ln 7)x - 10 \ln 7$$

$$(3 \ln 10)x - (6 \ln 7)x = 7 \ln 10 - 10 \ln 7$$

$$x(3 \ln 10 - 6 \ln 7) = 7 \ln 10 - 10 \ln 7$$

$$x = \frac{7 \ln 10 - 10 \ln 7}{3 \ln 10 - 6 \ln 7}$$

$$\begin{aligned} 7x - 5x &= 15 \\ x(7-5) &= 15 \\ x &= \frac{15}{2} \end{aligned}$$

$$10^{3x-7} = 7^{6x-10}$$

$$10^{3x} \cdot 10^{-7} = 7^{6x} \cdot 7^{-10}$$

$$\frac{10^{3x}}{7^{6x}} = \frac{7^{-10}}{10^{-7}}$$

$$\frac{(10^3)^x}{(7^6)^x}$$

$$\left(\frac{10^3}{7^6}\right)^x = \frac{7^{-10}}{10^{-7}}$$

$$\left(\frac{10^3}{7^6}\right)^x = \frac{7^{-10}}{10^{-7}}$$

$$\ln \left(\frac{10^3}{7^6}\right)^x = \ln \left(\frac{7^{-10}}{10^{-7}}\right)$$

$$x \cdot \ln \left(\frac{10^3}{7^6}\right)$$

$$x = \frac{\ln \left(\frac{7^{-10}}{10^{-7}}\right)}{\ln \left(\frac{10^3}{7^6}\right)}$$

$$= \frac{\ln \left(\frac{10^7}{7^{10}}\right)}{\ln \left(\frac{10^3}{7^6}\right)}$$