

EL7 HW

Note Title

1/23/2009

$$\textcircled{1} \quad \log 5^{\log x} = \log 10$$

$$\log x \log 5 = \log 10$$

$$10^{\log x} = \left(\frac{\log 10}{\log 5} \right) = \left(\frac{1}{\log 5} \right)$$

$$x = 10^{\frac{1}{\log 5}} \approx 26.957$$

can be done w/ other bases
compare decimal value

$$\textcircled{2} \quad 10^{\log(\log x)} = 2$$

$$10^{\log x} = 100$$

$$x = 10^{100}$$

$$\textcircled{3} \quad \log x^{\log x} = \log 10000$$

$$\log x \log x = 4$$

$$(\log x)^2 = 4 \rightarrow x = 10^2 = 100$$

$$10^{\log x} = 10^2 \rightarrow x = 10^2 = \frac{1}{100}$$

$$\textcircled{3b} \quad \frac{12}{3 + e^{-2t}} = \frac{3.5}{1}$$

$$12 = 3.5(3 + e^{-2t})$$

$$\frac{12}{3.5} = 3 + e^{-2t}$$

$$\ln\left(\frac{12}{3.5} - 3\right) = -2t + \ln e^{-2t}$$

$$\ln\left(\frac{12}{3.5} - 3\right) = -2t$$

$$t = \frac{-\ln\left(\frac{12}{3.5} - 3\right)}{2}$$

$$\textcircled{2c} \quad \ln(x^2 - 4) - \ln(x + 2) = \ln(3 - x)$$

$$e^{\ln\left(\frac{x^2 - 4}{x + 2}\right)} = e^{\ln(3 - x)}$$

$$\frac{x^2 - 4}{x + 2} = 3 - x$$

$$\frac{(x - 2)(x + 2)}{x + 2} = 3 - x$$

$$x - 2 = 3 - x$$

$$2x = 5$$

$$x = \frac{5}{2}$$

$$\textcircled{3d} \quad \log_7\left[\frac{4x}{x+3}\right] = \log_7(x)$$

$$\frac{4x}{x+3} = \frac{x}{1}$$

$$4x = x^2 + 3x$$

$$0 = x^2 - x$$

$$\frac{x(x-1)}{x-1} \rightarrow x = 1$$

#4-7 GRAPH!

8) $\frac{4}{1 + e^{-0.5x^2}} = a$

b)

$$4 = a(1 + e^{-0.5x^2})$$

$$\frac{4}{a} = 1 + e^{-0.5x^2}$$

$$\ln\left(\frac{4}{a} - 1\right) = \ln(e^{-0.5x^2})$$

$$\pm \sqrt{\frac{\ln\left(\frac{4}{a} - 1\right)}{-0.5}} = \pm \sqrt{\frac{\ln\left(\frac{4}{a} - 1\right)}{-0.5}}$$

$$x = \pm \sqrt{\frac{\ln\left(\frac{4}{a} - 1\right)}{-0.5}} = \pm \sqrt{\frac{2 \ln\left(\frac{4}{a} - 1\right)}{-1}} = \pm \sqrt{\frac{2 \ln\left(\frac{4-a}{a}\right)}{-1}} = \pm \sqrt{2 \ln\left(\frac{4-a}{a}\right)}$$

$$-\ln\left(\frac{4}{a} - 1\right) > 0$$

$$\ln\left(\frac{4}{a} - 1\right) < 0$$

$$\frac{4}{a} - 1 < 1$$

$$\frac{4}{a} < 2a$$

$$4 < 2a^2$$

$$\pm \sqrt{2 \ln\left(\frac{4-a}{a}\right)}$$

9a) $\log y = x \log 4$
 $10 \log y = 10 \log 4^x$
 $y = 4^x$

b) $\log y = 4 \log x$
 $\log y = \log x^4$
 $y = x^4$

e) $\log_2 y - \log_2 x = 3$
 $\log_2\left(\frac{y}{x}\right) = 3$
 $\frac{y}{x} = 2^3 = 8$
 $y = 8x$

c) $\log y = 2 - \frac{1}{3} \log(x-1)$

$$\log y + \frac{1}{3} \log(x-1) = 2$$

$$\log\left(y(x-1)^{\frac{1}{3}}\right) = 2$$

$$y(x-1)^{\frac{1}{3}} = 100$$

$$y = \frac{100}{\sqrt[3]{x-1}}$$

d) $\ln y = 2 \ln x - 0.3x - \ln 2$

$$\ln y - 2 \ln x + \ln 2 = -0.3x$$

$$\ln\left(\frac{2y}{x^2}\right) = -0.3x$$

$$\frac{2y}{x^2} = e^{-0.3x}$$

$$y = \frac{x^2 e^{-0.3x}}{2} \quad \text{or} \quad y = \frac{x^2}{2e^{0.3x}}$$