

NAME: Solution

MAC 1147 Section 3089

Quiz Seven

Please show all of your work in a NEAT and ORGANIZED fashion.

1. (3 points) Condense the following expression to the logarithm of a single quantity:

$$\begin{aligned} & \frac{1}{3} [\log(x+1) + \log(x+2)] - 2 \log x = \\ & \frac{1}{3} \log [(x+1)(x+2)] - 2 \log x = \\ & \log \sqrt[3]{(x+1)(x+2)} - \log x^2 = \\ & \log \left(\frac{\sqrt[3]{(x+1)(x+2)}}{x^2} \right) \end{aligned}$$

2. (3 points) Solve the exponential equation algebraically. (Give the exact solution; do not approximate.)

$$\begin{aligned} \frac{400}{1+e^{-x}} &= 350 \\ 400 &= 350 + 350e^{-x} \\ 50 &= 350e^{-x} \\ \frac{1}{7} &= e^{-x} \\ \ln\left(\frac{1}{7}\right) &= \ln(e^{-x}) \\ \ln\left(\frac{1}{7}\right) &= -x \rightarrow x = -\ln\left(\frac{1}{7}\right) = \ln 7 \end{aligned}$$

3. (3 points) Suppose you invest \$500 in an account at interest rate 4%, compounded continuously. Find the time required for the amount to double. (Give the exact solution; do not approximate.)

$$\begin{aligned} A = Pe^{rt} &= 500e^{0.04t} \rightarrow 1000 = 500e^{0.04t} \\ 2 &= e^{0.04t} \\ \ln 2 &= \ln(e^{0.04t}) \\ \ln 2 &= 0.04t \\ t &= \frac{\ln 2}{0.04} \text{ years} \end{aligned}$$