

NAME: Solution

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MAC 1147 Section 3077  
Quiz Seven

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

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

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

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

$$\begin{aligned} e^{2x} - 5e^x + 6 &= 0 \\ (e^x)^2 - 5e^x + 6 &= 0 \\ (e^x - 3)(e^x - 2) &= 0 \\ e^x = 3, \quad e^x = 2 & \\ \ln e^x = \ln 3, \quad \ln e^x = \ln 2 & \\ x = \ln 3, \quad x = \ln 2 & \end{aligned}$$

3. (3 points) Suppose you invest \$400 in an account at an annual interest rate of 2%, compounded continuously. Find the time required for the amount to double. (Give the exact solution; do not approximate.)

$$\begin{aligned} A = Pe^{rt} = 400e^{0.02t} &\rightarrow 800 = 400e^{0.02t} \\ 2 &= e^{0.02t} \\ \ln 2 &= \ln(e^{0.02t}) \\ \ln 2 &= 0.02t \\ t &= \frac{\ln 2}{0.02} \text{ years} \end{aligned}$$