Name: <u>C. Walker</u>

Quiz 7 Solutions
MAC 1147.3079, Fall 2015
Thursday, October 29, 2015

Show all relevant work to support your answer. A correct answer without supporting work will not earn the points. **Problems 3 and 4 are on the back.**

1. (1 point) What is your most memorable moment of the course so far? (Hint: There is no wrong answer)

1. <u>**responses for questions**</u>

2. (4 points) Solve the following equations for x:

   (a) $e^{2x} - 4e^x - 5 = 0$

   > **Solution:** We want the given equation to be a polynomial so it is easy to solve for x. Thus, we make the substitutions $u = e^x$ and $u^2 = e^{2x}$ into the given equation. Then we get $u^2 - 4u - 5 = 0$ as our new equation. Now factor to get $(u - 5)(u + 1) = 0$, and so $u = 5, -1$. Since we started with the variable x, our solution must contain x. So now substitute each u into $u = e^x$, so that $5 = e^x$ and $-1 = e^x$. Solving each equation using the natural log, we get $x = \ln 5, \ln -1$. Finally since $\ln x$ isn't defined for $x \le 0$, our only solution is $x = \ln 5$.

   (b) $2 + 3\ln x = 12$

   > **Solution:** First, we want to get $\ln x$ alone in the given equation. So subtract 2 from both sides, and then divide both sides of the equation by 3. Then we have $\ln x = \frac{10}{3}$. Now exponentiate both sides to get $x = e^{10/3}$ as our solution.

3. (2 points) Find the complement of $\frac{\pi}{3}$.

Solution: By definition, complementary angles must add up to $\frac{\pi}{2}$, or $90°$. Then, the complement of $\frac{\pi}{3}$ is $\frac{\pi}{2} - \frac{\pi}{3} = \frac{3\pi}{6} - \frac{2\pi}{6} = \frac{\pi}{6}$.

4. (3 points) Complete the table assuming interest is compounded continuously:

Initial Investment	Annual Percent Rate	Time to Double	Amount After 10 years
$750	10.5%	$\dfrac{\ln 2}{0.105}$	$750e^{1.05}$

Solution: First, we compute the time to double. Since interest is compounded continuously, we must use the formula $A = Pe^{rt}$, where A is the balance in the account after some time t (in years), P is the initial investment (principle), and r is the annual percent rate. Plugging in what we are given in the chart and letting $A = 2P = 1500$, we see $1500 = 750e^{0.105t}$. Dividing both sides by 750, we get $2 = e^{0.105t}$. Taking the natural log of both sides, we get $0.105t = \ln 2$ or simplified as $t = \dfrac{\ln 2}{0.105} \approx 6.60$ years.

Finally we solve for the amount after 10 years. Using the equation $A = Pe^{rt}$ and plugging in the initial values from the chart with $t = 10$, we have

$$A = 750e^{(0.105)(10)} = 750e^{1.05} \approx \$2143.24.$$