MATH CAMP: FALL 2013
HW # 3

1. Solve the following equations for x:
   a. $2e^{6x} = 18$
   b. $e^{x^2} = 1$
   c. $2^x = e^5$
   d. $2^{x-2} = 5$
   e. $\ln x^2 = 5$
   f. $\ln x^{5/2} - 0.5 \ln x = \ln 25$

2. Derive a formula for the amount of time that it takes money to triple in a bank account that pays interest at rate r compounded continuously.

3. Compute the first and second derivatives for each of the following functions:
   a. xe^{3x}
   b. e^{x^2+3x-2}
   c. $\ln(x^4 + 2)^2$
   d. $\frac{x}{e^x}$
   e. $\frac{x}{\ln x}$
   f. $\frac{\ln x}{x}$

4. Suppose a linear supply and demand model has the generic form:

   Demand: $q = \beta_1 + \beta_2 p$

   Supply : $q = \gamma_1 + \gamma_2 p$

   where the parameters β_1, β_2, γ_1, and γ_2 are all positive or negative as may be appropriate for the context.
   a. Write this system of linear equations in matrix form, $Ax = b$.
   b. Find the generic equilibrium solution values p^* and q^* in terms of the parameters.
   c. Under what conditions will this system <u>have</u> a solution, and a unique solution? This is a mathematical issue.