

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 $\beta_1, \beta_2, \gamma_1, \gamma_2$ 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 have a solution, and a unique solution?