Math 140 Help Session Interview Questions

1. A company has fixed costs of \$900 and they incur total costs of \$6000 when 300 items are made. They sell each item for \$22. Find the company's break-even quantity and revenue. (Assume both cost and revenue are linear functions.)

2. Equation A: $3p + 2x - 6 = 0$
   Equation B: $2p - 4x - 2 = 0$
   (a) If the given equations are the supply and demand functions for a market, which equation is which?
   (b) Find the equilibrium point for this market.

3. Ben invested a total of \$25,000 into three companies: X, Y, and Z. Company X earns interest of 5%/yr, Company Y earns interest of 7%/yr, and Company Z earns interest of 9%/yr. Ben invested twice as much money in Company Y as in Company Z, and the total amount of interest he earned in a year was \$1320. How much money did Ben invest in each company?

4. Perform the next pivot in the Gauss-Jordan method for the following matrix.
$$\left[\begin{array}{ccc|c} 1 & 2 & 2 & 4 \\ 0 & 3 & 6 & -9 \\ 0 & -5 & 2 & 1 \end{array}\right]$$

5. Solve for a, b, c, and d in the following matrix equation.
$$\begin{bmatrix} 1 & 2 \\ a & b \end{bmatrix} \begin{bmatrix} 3 & 1 \\ 2 & 0 \end{bmatrix} = \begin{bmatrix} c & d \\ 4 & -1 \end{bmatrix} + 2 \begin{bmatrix} 3 & 4 \\ 6 & 1 \end{bmatrix}$$

6. The Floral Factory makes three kinds of corsages: Junior, Deluxe, and Grande. Each Junior corsage uses 1 flower, 2 accessories and 10 minutes of labor. Each Deluxe corsage uses 2 flowers, 3 accessories and 15 minutes of labor. Each Grande corsage uses 4 flowers, 6 accessories and 20 minutes of labor. The shop has 40 flowers and 80 accessories in inventory and 6 hours of labor available. If a Junior corsage sells for \$5, a Deluxe for \$8 and a Grande for \$12, how many of each type of corsage should be made to maximize the revenue for the Floral Factory? **Set up this linear programming problem, but DO NOT solve.**

7. A game costs \$4 to play. You randomly select a card from a standard 52-card deck. If the card is a spade or an Ace you win \$7. Otherwise, you win nothing. Find the expected net winnings for a person who plays this game.

8. A company has a price-demand equation given by $p = -4x + 300$. What is the company's maximum revenue?

9. Solve the following equation for x.
   $\log_3(x^2) = 2 + \log_3(x - 2)$

10. An investment of \$300 grew to \$700 in a period of 3 years. Find the annual interest rate for the account if the account compounds interest continuously.

11. Find the zeros of the function $f(x) = 3x^3 + 2x^2 - 2x$.

12. Evaluate and simplify $\dfrac{f(x+h) - f(x)}{h}$ for the functions below.

    (a) $f(x) = \dfrac{1}{2x+3}$

    (b) $f(x) = 2x^2 - 3x + 1$

    (c) $f(x) = \sqrt{2x-1}$

13. State the domain of each of the following functions using interval notation.

    (a) $f(x) = \dfrac{\sqrt{x+6}}{x^2-9}$

    (b) $f(x) = \dfrac{\ln(4x+9)}{\sqrt{12-2x}}$