

Math 141 Week-in-Review 2 Problem Set

1. A DVD company incurs \$3,000 in fixed costs each month and production costs of \$8 per DVD. The company earns a profit of \$4,200 when they sell 600 DVDs in a month.

(a) What is the selling price of a DVD?

(b) What is the profit function for this company?

(c) What is the break-even point?

2. An office goods store found that they can sell 90 pens per week if they cost \$1, but if they increase the price by \$1, then only 30 pens are sold. However the suppliers are only willing to supply 60 pens when the unit price is \$2, and will not supply any pens if the unit price is \$1 or below.

(a) Find the supply and demand equations (assuming they are linear).

(b) Find the market equilibrium.

3. A study was done concerning the relationship between the average number of hours a student spends on MySpace in a day and their GPA at the end of the semester. The results are given in the following table. (Note: I made this up. It is not a real study.)

Hours, x	0	1	2	3	4	5
GPA, y	3.5	3.2	3.0	2.6	2.5	2.1

(a) Find the least-squares line that models this data. (Round to 4 decimal places.)

(b) How well does the line fit the data?

(c) Predict the GPA of a student who spends on average 6.5 hours a day on MySpace.

(d) How many hours a day would you expect a student with a GPA of 3.1 to have spent on MySpace?

4. Solve the following systems of equations.

(a) $3x - y = 7$
 $6x + 2y = 10$

(b) $4x - 2y = 6$
 $8x - 4y = 16$

5. Find the value of k which makes the following system of equations have infinitely many solutions.

$$2x + 8y = -8$$

$$3x + ky = -12$$

6. Suppose I had a drink stand where I sold bottles of lemonade, Koolaid, and Gatorade. I sold each bottle of lemonade for \$1.25, each bottle of Koolaid for \$1.75, and each bottle of Gatorade for \$2.50. At the end of a certain day, I had sales of \$254. In all I had sold 158 bottles, and I knew that I sold three times as many lemonade bottles as Gatorade bottles. How many bottles of each drink did I sell? Set up and solve this problem.

7. Freebirds offers regular, monster, and super monster burritos. A regular burrito gets 1 serving of rice, 2 servings of beans, and 1 serving of meat. A monster burrito gets 2 servings of rice, 2 servings of beans, and 2 servings of meat. A super monster gets 3 servings of rice, 3 servings of beans, and 4 servings of meat. Suppose that Freebirds has 1085 servings of rice, 1410 servings of beans, and 1195 servings of meat available. If all of the available servings are used on a given day, how many of each size of burrito were made? Set up and solve this problem.

8. State whether the following matrices are in row-reduced form. If the matrix is NOT in row-reduced form, what would be the next row operation needed in the Gauss-Jordan Elimination Method?

(a)
$$\left[\begin{array}{ccc|c} 1 & 0 & 0 & 2 \\ 0 & 1 & 0 & 3 \\ 0 & 1 & 2 & 4 \end{array} \right]$$

(b)
$$\left[\begin{array}{ccc|c} 1 & 2 & 0 & 3 \\ 0 & 0 & 1 & 4 \end{array} \right]$$

(c)
$$\left[\begin{array}{cc|c} 1 & 2 & 3 \\ 0 & 1 & -2 \end{array} \right]$$

(d)
$$\left[\begin{array}{ccc|c} 1 & 0 & 0 & 2 \\ 0 & -1 & 3 & -4 \\ 0 & 0 & 0 & 0 \end{array} \right]$$

9. Pivot the following matrix about the boxed element. Indicate the row operations used.

$$\left[\begin{array}{ccc|c} 1 & 2 & 4 & -3 \\ 0 & \boxed{3} & -9 & 12 \\ 0 & -5 & 2 & 1 \end{array} \right]$$

10. Solve the following systems of equations. If there are infinitely many solutions, make sure you parameterize the solution.

(a) $x = -z - 2$
 $x + y + z = -2$
 $3x + 2y + 2z = -3$
 $y = 2 - 2x$

$$\begin{aligned} \text{(b)} \quad & x + 2y + z = 3 \\ & 3x + 3y + 3z = 7 \\ & 2x + y + 2z = 1 \end{aligned}$$

$$\begin{aligned} \text{(c)} \quad & 2x + y - z = 0 \\ & x - 3y + z = 1 \\ & x + 4y - 2z = -1 \end{aligned}$$

$$\begin{aligned} \text{(d)} \quad & x + 2y + z - 3w = 4 \\ & -2x + y + z + w = 2 \\ & -x + 3y + 2z - 2w = 6 \end{aligned}$$