Section 2.3: Systems of Two Equations in Two Unknowns

1. State the type of linear system given without graphing or actually computing the solution. Then, state the number of solutions.

$$\begin{cases} 4x + 5y = 12 \\ 2x = -\frac{5}{2}y + 6 \end{cases}$$

2. Find the value of k so that the following system of equations has no solution.

$$\begin{cases} y = \frac{5}{4}x + 1 \\ 10x - ky = -6 \end{cases}$$

3. Solve each system using the stated method. Write any solutions as ordered pairs with exact values. For parametric solutions use p as your parameter.

(a) $\begin{cases} 3x + 2y = 5 \\ y = -\frac{3}{2}x + 2 \end{cases}$, using the graphical method.

(b) $\begin{cases} 3x - 2y = -3 \\ 5x - y = 2 \end{cases}$, using the substitution method.

(c) $\begin{cases} 3x - 2y = -4 \\ 4y = 6x + 8 \end{cases}$, using the addition method.

4. The production cost for a record company are \$18 per record and if they produce 60 records, then the total costs are \$1652. The company sells each record for \$40. Determine and interpret the break-even point for the record company on the production and sale of these records.

5. Consumers will buy 10,000 items at a price of \$120 per item. If the price goes up by \$30 per item, then they will only buy 7600 items. Producers will not market this item below \$40, but if the price per item increases by \$25, the producers will provide 6000 items to the market. Determine and interpret the market equilibrium point for these items.

Section 2.4: Setting Up and Solving Systems of Linear Equations

1. Set up, but do not solve, a system of linear equations which could be used to solve the problem.

You have \$50,000 to invest in Fund A and Fund B. Fund A pays 7.4% and Fund B pays 9.8%. How much do you invest in each to get a return of \$4,072 per year?

2. Write the corresponding augmented matrix for the systems of linear equations.

$$\begin{cases} 4x + 2y + 3z = 72 \\ 2y - 3z = 12 \\ -x + 9 = 5y + z \end{cases}$$

3. Write a system of linear equations which corresponds to the augmented matrix. Assume the variables are x and y or x, y, and z.

$$\left[\begin{array}{ccc|c} -2 & -6 & -10 & -12 \\ 0 & 1 & 2 & 3 \\ 2 & 1 & 2 & -5 \end{array}\right]$$

4. Perform the indicated row operation and write the resulting matrix.

$$\left[\begin{array}{cc|c} 1 & -4 & 1 \\ 5 & 2 & 19 \end{array}\right] \qquad -5R_1 + R_2 \to R_2 \quad \longrightarrow$$

5. State if the matrix is in reduced row-echelon form. If the matrix is not in reduced row-echelon form, state which of the four conditions is first violated, as stated in the definition.

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

(b) $\left[\begin{array}{ccc|c} 1 & 2 & 0 & 3 \\ 0 & 0 & 1 & -5 \\ 0 & 0 & 0 & 0 \end{array}\right]$

6. Solve each system of linear equations using matrices. Write your answer as an ordered pair or ordered triple, as appropriate. For parametric solutions use t as your parameter.

(a) $\begin{cases} 3x + 5y = -2 \\ -9x - 15y = 6 \end{cases}$

(b) $\begin{cases} x + 4z = 0 \\ x + y = -2z + 1 \\ 6z - 3x = -3y + 15 \end{cases}$