Week-In-Review #2 (2.1-2.3)

1. Given the following system:

$$-2x + 3y = 9$$
$$kx - 2y = -6$$

For what value(s) of k is/are there:

(a) exactly one solution?

(b) no solutions?

(c) infinitely many solutions?

2. Are the following augmented matrices in reduced row-echelon form?

If YES, write the resulting simplified system and corresponding solution. (Assume variables are x and y or x, y and z.)

If NO, write the next best row operation you would use in the Gauss-Jordan Elimination Method.

(a) $\left[\begin{array}{cc|c} 1 & 0 & 2 \\ 0 & 1 & 3 \\ 0 & 0 & 0 \\ 0 & 0 & 1 \end{array}\right]$ (b) $\left[\begin{array}{ccc|c} 1 & 3 & 0 & 2 \\ 0 & 1 & 1 & 3 \end{array}\right]$ (c) $\left[\begin{array}{ccc|c} 1 & 0 & 1 & 1 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & -4 & 6 \end{array}\right]$

(d) $\left[\begin{array}{ccc|c} 1 & 0 & 0 & 5 \\ 0 & 0 & 1 & 6 \\ 0 & 1 & 0 & 7 \end{array}\right]$ (e) $\left[\begin{array}{ccc|c} 1 & 0 & 3 & 10 \\ 0 & 1 & 5 & 20 \\ 0 & 0 & 0 & 0 \end{array}\right]$ (f) $\left[\begin{array}{cc|c} 1 & 0 & 4 \\ 0 & 1 & 5 \\ 0 & 0 & 0 \end{array}\right]$

3. For each of the following two matrices, perform the next three best row operations in the Gauss-Jordan Elimination Method. Indicate the row operations being used, and show all intermediate matrices.

(a) $\left[\begin{array}{ccc|c} 1 & 0 & 0 & 10 \\ 0 & 4 & -8 & 12 \\ 0 & 2 & 3 & -8 \end{array}\right]$ (b) $\left[\begin{array}{cc|c} 1 & -2 & 5 \\ 3 & 4 & 7 \end{array}\right]$

4. Pivot the following system about the element in row 3, column 3.

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

5. Solve the following systems of equations. If there are infinitely many solutions, find both the parametric solution and one specific solution.

(a) $4x - 2y + z = 30$
$-x + 5y - 2z = -10$
$2x + 8y - 3z = 15$

(b) $2x + y = 8 - z$
$3y = x + z + 10$
$5y - 5z = x + 18$
$y - 5z = 2x$

(c) $x + 2y + z = 10$
$-x + 4z = 20 + 3y$
$x + y = 40 - 6z$

(d) $x + 2y + 3z - 4w = 10$
$2x - 4y + 2z + 6w = 20$
$3x - 10y + z + 16w = 30$

6. **Set up a system of equations representing the following problem and then find the solution to the problem.**
A company makes three different wallpapers, each containing three dyes: maroon, green, and blue. Each roll of wallpaper I uses 3 units of maroon, 2 units of green, and 1 unit of blue. Each roll of wallpaper II uses 5 units of maroon, 4 units of green, and 1 unit of blue. Each roll of wallpaper III uses 1 unit of each color of dye. There are 800 total units of maroon, 600 total units of green, and 300 total units of blue available. If all the dye is used, how much of each wallpaper is made?

7. **Set up a system of equations representing the following problem and then find the solution to the problem.**
A fast food restaurant has three sizes of drinks: small, medium, and large. The price of each is \$0.79, \$0.99, and \$1.29, respectively. On a tax-free holiday, a total of 80 drinks are sold, bringing in a revenue of \$92.20. On that day, twice as many medium drinks were sold as small drinks. How many of each type of drink were sold?

8. **Set up a system of equations representing the following problem and then find the solution to the problem. If the solution is parametric, then tell what restrictions can be placed on the parameter(s).**
A moving company wants to purchase a fleet of 24 trucks with a combined carrying capacity of 250,000 pounds. Trucks with three different carrying capacities are available: 6,000 pounds, 8,000 pounds, and 18,000 pounds. How many of each type of truck should be purchased?