Exam 2

MAT 123, Summer 2016

Name:

1. (7 points) Solve the system of equations.

   (a) $5x + 4y = -30$
   $3x - 9y = -18$

   (b) $3 + 2x_1 - x_2 = 0$
   $-3 - 7x_2 = 10x_1$

2. (5 points) Write the matrix form for each system of equations.

   (a) $x + 3y - 4z = -2$
   $x + 5y + 2z = 4$
   $-3x - 7y + 6z = 12$

   (b) $-3x_2 - 6x_3 + 4x_4 = 0$
   $-x_1 - 2x_2 - x_4 = 1$
   $x_1 + 4x_2 = -1$
   $x_5 = 17$

3. (8 points) Solve the system of equations using Gaussian elimination. For full credit, you must clearly indicate your row operations at each step.

   (a) $3x + 2y = 4$
   $8x - 3y = -6$

(b) $\begin{aligned} \frac{1}{2}x + y &= 7 \\ 3x + 6y &= -3 \end{aligned}$

4. (5 points) The following matrices are in reduced row echelon form. Write the solution to the corresponding system of equations, using free variables as needed.

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

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

5. Define the matrices $A = \begin{bmatrix} 2 & 0 \\ -3 & 6 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & -4 \\ 1 & 0 \end{bmatrix}$.

   (a) Find $A + B$.

   (b) Find $3B - 2A$.

6. Define the matrices $A = \begin{bmatrix} 1 & 2 \\ -3 & 0 \\ -1 & 1 \end{bmatrix}$, $B = \begin{bmatrix} 3 & -4 \\ -1 & 0 \end{bmatrix}$, $C = \begin{bmatrix} 2 \\ 3 \end{bmatrix}$, and $D = \begin{bmatrix} -2 & 5 \end{bmatrix}$. Evaluate the following products, or state that the answer is undefined.

(a) AB

(b) BC

(c) BD

7. (5 points) Find the inverse of $A = \begin{bmatrix} 3 & 4 \\ 5 & 6 \end{bmatrix}$. Describe your row operations at each step.

8. A collector has a bag containing 40 coins. Gold coins are worth \$25 each, and silver coins are worth \$10. The total value of all the coins in the bag is \$760. How many of each type of coin are in the bag?

9. A company manufactures and sells audio chip. They have found that the supply of chips is described by the equation

$$y = 3.2 + 0.4x$$

where y is the price in dollars, and x is hundreds of chips. The demand for the same item is given by

$$y = 17 - 1.9x$$

If the price of chips is currently \$6, what do you predict will happen to this price in the future?

10. Solve the system of inequalities. Give the coordinates of any corner points.

$$3x + y \leq 1$$
$$x + 2y \geq -8$$