

## 6.1 Systems of Linear Equations

Solve each system of linear equations.

1)  $x + 2y = -3$   
 $-3x - 3y = -3$

2)  $x + 2y = -3$   
 $-5x - 4y = -9$

3)  $-4y + z = -3$   
 $4x + 4y + 3z = -13$   
 $5x + 2y - 2z = 1$

4)  $3x + z = -2$   
 $-x + 4y - 4z = -11$   
 $2x + 3y - 2z = -10$

5) A collection of dimes and quarters is worth \$15.25. There are 103 coins in all. How many of each type of coins are there?

**Write the following systems as matrix equations.**

$$\begin{aligned} 6) \quad & -4x + 2y = -10 \\ & -2x - 3y = 7 \end{aligned}$$

$$\begin{aligned} 7) \quad & -4x + 2y = -2 \\ & -2x - 3y = -5 \end{aligned}$$

**Write the augmented matrix for each system of linear equations.**

$$\begin{aligned} 8) \quad & 5x - 3y + 5z = -3 \\ & x - 3y = -1 \\ & -2x + 3y + 3z = -7 \end{aligned}$$

$$\begin{aligned} 9) \quad & -5x - 2y + 3z = -17 \\ & -5x - y + z = -18 \\ & 3y + 3z = -12 \end{aligned}$$

**Find the inverse of each matrix. Show all work.**

$$10) \begin{bmatrix} -1 & 1 \\ 5 & 2 \end{bmatrix}$$

$$11) \begin{bmatrix} -4 & 9 \\ 1 & -1 \end{bmatrix}$$

$$12) \begin{bmatrix} 5 & 1 \\ -11 & -1 \end{bmatrix}$$

$$13) \begin{bmatrix} -1 & 0 \\ -2 & 5 \end{bmatrix}$$

**Find the inverse of each matrix.**

$$14) \begin{bmatrix} 3 & 4 & 0 \\ -1 & 1 & 6 \\ 2 & 4 & 0 \end{bmatrix}$$

$$15) \begin{bmatrix} 1 & 4 & -5 \\ -1 & -6 & -2 \\ 2 & -4 & 0 \end{bmatrix}$$

**Simplify. Write "undefined" for expressions that are undefined.**

$$16) \begin{bmatrix} -3 & -1 \\ 2 & -5 \end{bmatrix} \cdot \begin{bmatrix} 0 & 6 & -5 \\ 3 & -6 & 3 \end{bmatrix}$$

$$17) \begin{bmatrix} 5 & -2 & 5 \\ -1 & -5 & 2 \end{bmatrix} \cdot \begin{bmatrix} -1 & -1 \\ 5 & -2 \\ 1 & 5 \end{bmatrix}$$

**Evaluate the determinant of each matrix.**

$$18) \begin{bmatrix} -1 & -1 \\ -1 & 0 \end{bmatrix}$$

$$19) \begin{bmatrix} 2 & 3 \\ 2 & -4 \end{bmatrix}$$

**Write the following systems as matrix equations. Then solve using matrices. Show all work.**

$$20) \begin{aligned} 3x + 3y &= -3 \\ x + 2y &= -4 \end{aligned}$$

$$21) \begin{aligned} x - y &= 2 \\ -x + 4y &= -11 \end{aligned}$$

$$\begin{aligned} 22) \quad & 3x + y = -5 \\ & x - 4y = 7 \end{aligned}$$

$$\begin{aligned} 23) \quad & -2x - 4y = -10 \\ & -2x - 5y = -12 \end{aligned}$$

$$\begin{aligned} 24) \quad & -3x + 3y + 2z = -17 \\ & x - 3z = -10 \\ & -x - y + 4z = 19 \end{aligned}$$

$$\begin{aligned} 25) \quad & -2y - 3z = 0 \\ & 2x + 5y + z = 19 \\ & 3x + 3y + 4z = 10 \end{aligned}$$