

9.5 Determinants and Cramer's Rule

Find the determinant of the given matrices.

1.
$$\begin{bmatrix} 2 & 3 \\ -1 & 4 \end{bmatrix}$$

2.
$$\begin{bmatrix} -1 & 4 \\ 2 & 5 \end{bmatrix}$$

3.
$$\begin{bmatrix} 5 & 2 \\ -7 & -4 \end{bmatrix}$$

4.
$$\begin{bmatrix} 6 & 4 \\ 0 & 0 \end{bmatrix}$$

5.
$$\begin{bmatrix} 1 & -2 & 4 \\ 1 & 0 & 2 \\ -1 & 2 & -1 \end{bmatrix}$$

6.
$$\begin{bmatrix} 3 & -1 & 2 \\ 1 & 0 & -1 \\ 1 & -1 & 3 \end{bmatrix}$$

Solve the system of equations using Cramer's Rule.

7.
$$\begin{aligned} x + y &= -1 \\ 3x - y &= 9 \end{aligned}$$

8.
$$\begin{aligned} 2x + y &= -5 \\ -x - 4y &= 6 \end{aligned}$$

9.
$$\begin{aligned} x + y - 5z &= -18 \\ 3x - 3y + z &= 6 \\ x + 3y - 2z &= -13 \end{aligned}$$

10.
$$\begin{aligned} x + y - z &= 4 \\ 2x - y + z &= -1 \\ x - 2y + 3z &= -6 \end{aligned}$$

$$\begin{aligned} 11. \quad & x + 3y - 6z = 7 \\ & 2x - y + z = 1 \\ & x - 2y + 2z = -1 \end{aligned}$$

$$\begin{aligned} 12. \quad & 3x + 5y - z = -2 \\ & 4x - y + 2z = 1 \\ & -6x - 10y + 2z = 0 \end{aligned}$$

$$\begin{aligned} 13. \quad & 2x + y - z = -2 \\ & 3x - 2y + z = -9 \\ & x + y - z = 0 \end{aligned}$$

SOLUTIONS:

1. 11

2. -13

3. -6

4. 0

5. 6

6. -1

7. $x = 2, y = -3$

7. $x = -2, y = -1$

9. $x = -1, y = -2, z = 3$

10. $x = 1, y = 2, z = -1$

11. $x = 0, y = 0, z = -1$

12. No solution. The determinant of the coefficient matrix is zero.

13. $x = -2, y = 1, z = -1$