

Math 110 – Chapter 6 – Worksheet 2 – Version A

The Matrix Inverse; Determinants and the Cramer's Rule

6.3 The Matrix Inverse

1. Verify that matrices A and B are inverses of each other.

$$A = \begin{bmatrix} 3 & 2 \\ 2 & 1 \end{bmatrix} \quad B = \begin{bmatrix} -1 & 2 \\ 2 & -3 \end{bmatrix}$$

2. Show that the matrix $A = \begin{bmatrix} 3 & 1 \\ 6 & 2 \end{bmatrix}$ does not have an inverse.
3. Find the inverse of the matrix, if it exists.

$$A = \begin{bmatrix} 1 & 4 & -2 \\ -1 & 1 & 2 \\ 3 & 7 & -6 \end{bmatrix}$$

4. Write the system of linear equations as a matrix equation $AX = B$.

$$\begin{cases} x + 3y + z = 9 \\ x - 5y + 2z = 7 \\ 3x + y - 4z = -9 \end{cases}$$

5. Use the inverse of the coefficient matrix to solve the system of linear equations.

$$\begin{cases} 3x + 2y + 3z = 9 \\ 3x + y = 12 \\ x + z = 6 \end{cases}$$

6.4 Determinants and the Cramer's Rule

6. Evaluate each determinant.

$$(a) \quad \begin{vmatrix} 5 & 1 \\ 3 & -7 \end{vmatrix} \quad (b) \quad \begin{vmatrix} 2 & -9 \\ -4 & 18 \end{vmatrix}$$

7. For the matrix $A = \begin{bmatrix} 3 & -1 & 2 \\ 4 & 5 & 6 \\ 7 & 1 & 2 \end{bmatrix}$, find the following:

- a) The Minors M_{11} , M_{23} and M_{32}
b) The cofactors C_{11} , C_{23} and C_{32}

8. Find the determinant of the matrix $A = \begin{bmatrix} 2 & -3 & 7 \\ -2 & -1 & 9 \\ 0 & 2 & -9 \end{bmatrix}$

9. Use the Cramer's Rule to solve the system of linear equations.

$$\begin{cases} 2x + 3y = 7 \\ 5x + 9y = 4 \end{cases}$$

10. Use the Cramer's Rule to solve the system of linear equations.

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