

Matrix Practice Problems

A. Problems on Addition Matrices

1. Given matrices $A = \begin{bmatrix} 2 & -3 \\ 5 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 2 \\ 3 & 1 \end{bmatrix}$. Calculate $A + B$ and $A - B$.
2. Find the transpose of matrix $C = \begin{bmatrix} 4 & -2 \\ 1 & 6 \end{bmatrix}$.
3. If $D = \begin{bmatrix} 3 & 0 \\ -2 & 5 \end{bmatrix}$, compute the matrix $2D$.
4. Given matrix $E = \begin{bmatrix} 0 & 2 \\ -3 & 4 \end{bmatrix}$. Determine whether this matrix is symmetric or not.
5. Find the inverse of matrix $F = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, if it exists.

B. Problems on Matrix Multiplication

1. Compute the product $A \times B$ where $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 0 \\ 1 & 3 \end{bmatrix}$.
2. Given $G = \begin{bmatrix} 2 & 3 \\ 0 & 1 \end{bmatrix}$ and $H = \begin{bmatrix} 1 & 0 \\ -1 & 2 \end{bmatrix}$. Calculate the product $G \times H$.
3. If $P = \begin{bmatrix} 1 & -1 & 2 \\ 0 & 3 & 4 \end{bmatrix}$ and $Q = \begin{bmatrix} 2 & 1 \\ 3 & 0 \\ -1 & 2 \end{bmatrix}$, compute $P \times Q$.

C. Problems on Determinants

1. Calculate the determinant of matrix $I = \begin{bmatrix} 2 & 3 \\ 1 & 4 \end{bmatrix}$.
2. Find the determinant of matrix $J = \begin{bmatrix} 5 & 2 \\ -3 & 1 \end{bmatrix}$.
3. Calculate the determinant of the following 3x3 matrix:

$$K = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

4. Find the determinant of the following 3x3 matrix:

$$L = \begin{bmatrix} 2 & 0 & 1 \\ 3 & 4 & -2 \\ 1 & 5 & 3 \end{bmatrix}$$

D. Problems on Cramer's Rule

1. Use Cramer's rule to solve the following system of linear equations:

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

2. Solve the following system of linear equations using Cramer's rule:

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

3. Find the solution for the following system of equations using Cramer's rule:

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

4. Solve the following system of linear equations using Cramer's rule:

$$\begin{cases} x + y = 3 \\ 2x - y = 1 \end{cases}$$