Matrix

Exercise 1.3 for Class IX

Q.1: Which of the following matrices are conformable for addition?

$A = \begin{bmatrix} 2 & 1 \\ -1 & 3 \end{bmatrix}$ $B = \begin{bmatrix} 3 \\ 1 \end{bmatrix}$ $C = \begin{bmatrix} 1 & 0 \\ 2 & -1 \\ 1 & -2 \end{bmatrix}$ $D = \begin{bmatrix} 2+1 \\ 3 \end{bmatrix}$

Q.2: Find additive inverse of the following matrices:

$A = \begin{bmatrix} 2 & 4 \\ -2 & 1 \end{bmatrix}$ $B = \begin{bmatrix} 1 & 0 & -1 \\ 2 & -1 & 3 \\ 3 & -2 & 1 \end{bmatrix}$ $C = \begin{bmatrix} 4 \\ -2 \end{bmatrix}$

$D = \begin{bmatrix} 1 & 0 \\ -3 & -2 \\ 2 & 1 \end{bmatrix}$ $E = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ $F = \begin{bmatrix} \sqrt{3} & 1 \\ -1 & \sqrt{2} \end{bmatrix}$

Q.3: If $A = \begin{bmatrix} -1 & 2 \\ 2 & 1 \end{bmatrix}$, $B = \begin{bmatrix} 1 \\ -1 \end{bmatrix}$, $C = [1 \ -1 \ 2]$ **and** $D = \begin{bmatrix} 1 & 2 & 3 \\ -1 & 0 & 2 \end{bmatrix}$ **then find:**

(i). $A + \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$ (ii). $B + \begin{bmatrix} -2 \\ 3 \end{bmatrix}$ (iii). $C + [-2 \ 1 \ 3]$

(iv). $D + \begin{bmatrix} 0 & 1 & 0 \\ 2 & 0 & 1 \end{bmatrix}$ (v). $2A$ (vi). $(-1)B$

(vii). $(-2)C$ (viii). $3D$ (ix). $3C$

Q.4: Perform the indicated operations and simplify the following:

(i). $\left(\begin{bmatrix} 1 & 2 \\ 0 & 0 \end{bmatrix} + \begin{bmatrix} 0 & 2 \\ 3 & 0 \end{bmatrix}\right) + \begin{bmatrix} 1 & 1 \\ 1 & 0 \end{bmatrix}$

(ii). $\begin{bmatrix} 1 & 1 \\ 1 & 0 \end{bmatrix} + \left(\begin{bmatrix} 0 & 2 \\ 3 & 0 \end{bmatrix} - \begin{bmatrix} 1 & 1 \\ 1 & 0 \end{bmatrix}\right)$

(iii). $[2 \ 3 \ 1] + ([1 \ 0 \ 2] - [2 \ 2 \ 2])$

(iv). $\begin{bmatrix} 1 & 2 & 3 \\ -1 & -1 & -1 \\ 0 & 1 & 2 \end{bmatrix} + \begin{bmatrix} 1 & 1 & 1 \\ 2 & 2 & 2 \\ 3 & 3 & 3 \end{bmatrix}$

(v). $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 1 \\ 3 & 1 & 2 \end{bmatrix} + \begin{bmatrix} 1 & 0 & -2 \\ -2 & 1 & 0 \\ 0 & 2 & -1 \end{bmatrix}$

(vi). $\left(\begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix} + \begin{bmatrix} 2 & 1 \\ 1 & 0 \end{bmatrix}\right) + \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$

Q.5: For the Matrices $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 1 \\ 1 & -1 & 0 \end{bmatrix}$, $B = \begin{bmatrix} 1 & -1 & 1 \\ 2 & -2 & 2 \\ 3 & 1 & 3 \end{bmatrix}$ *and* $C = \begin{bmatrix} -1 & 0 & 0 \\ 0 & -2 & 3 \\ 1 & 1 & 2 \end{bmatrix}$ **verify the following rules:**

(i). $A + C = C + A$ (ii). $A + B = B + A$

(iii). $B + C = C + B$ (iv). $A + (B + A) = 2A + B$

(v). $(C - B) + A = C + (A - B)$ (vi). $2A + B = A + (A + B)$

(vii). $(C-B)\ A = (C - A) - B$ (viii). $(A + B) + C = A + (B + C)$

(ix). $A + (B - C) = (A - C) + B$ (x). $2A + 2B = 2(A + B)$

Q.6: If $A = \begin{bmatrix} 1 & -2 \\ 3 & 4 \end{bmatrix}$ *and* $B = \begin{bmatrix} 0 & 7 \\ -3 & 8 \end{bmatrix}$ **find:**

(i). $3A - 2B$ (ii). $2A^t - 3B^t$

Q.7: If $2\begin{bmatrix} 2 & 4 \\ -3 & a \end{bmatrix} - 3\begin{bmatrix} 1 & b \\ 8 & -4 \end{bmatrix} = \begin{bmatrix} 7 & 10 \\ 18 & 1 \end{bmatrix}$ **then find the value of a & b.**

Q.8: **If** $A = \begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$ *and* $B = \begin{bmatrix} 1 & 1 \\ 2 & 0 \end{bmatrix}$ **then verify that:**

(i). $(A + B)^t = A^t + B^t$ (ii). $(A - B)^t = A^t - B^t$

(iii). $A + A^t$ is symmetric. (iv). $A - A^t$ is skew-symmetric.

(v). $B + B^t$ is symmetric. (vi). $B - B^t$ is skew-symmetric.