Matrix

addition :- properties :-

ii) $A + B = B + A$

iii) $(A+B)+C = A+(B+C)$

$A = \begin{bmatrix} 0 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 2 & 4 \end{bmatrix}$, $C = \begin{bmatrix} 4 & 7 \end{bmatrix}$

$\Rightarrow A+B = \begin{bmatrix} 2 & 6 \end{bmatrix}$ | $B+C = \begin{bmatrix} 6 & 11 \end{bmatrix}$

$(A+B)+C = \begin{bmatrix} 6 & 13 \end{bmatrix}_{1\times 2}$ | $A+(B+C) = \begin{bmatrix} 6 & 13 \end{bmatrix}_{1\times 2}$

Matrix

addition:- properties:-

$A + B = B + A$ ✓

$A - B \neq B - A$

$4 - 3 = 1$
$3 - 4 = -1$ ✗

i) $A + O = O + A = A$

$$\begin{bmatrix} 1 & 2 \\ 4 & 3 \end{bmatrix} + \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix} = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix} + \begin{bmatrix} 1 & 2 \\ 4 & 3 \end{bmatrix} = A$$

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

iv) $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \rightarrow -A = \begin{bmatrix} -1 & -2 \\ -3 & -4 \end{bmatrix}$

$\Rightarrow \boxed{A + (-A) = O}$

Multiply Matrix A By Scalar: i) $\rightarrow k(A+B) = kA + kB$

ii) $\rightarrow (k+p)A = kA + pA$

Matrix

Qus:- $A+B=\begin{bmatrix}3 & 1\\ -7 & 4\end{bmatrix}$ & $A-B=\begin{bmatrix}0 & 2\\ 4 & 3\end{bmatrix}$

Find A & B.

Soln:-

$\because A+B=\begin{bmatrix}3 & 1\\ -7 & 4\end{bmatrix}=C$; $A-B=\begin{bmatrix}0 & 2\\ 4 & 3\end{bmatrix}=D$

Now:- add C & D $\Rightarrow C+D=\begin{bmatrix}3 & 1\\ -7 & 4\end{bmatrix}+\begin{bmatrix}0 & 2\\ 4 & 3\end{bmatrix}$

$\Rightarrow A+B+A-B=\begin{bmatrix}3+0 & 1+2\\ -7+4 & 4+3\end{bmatrix}$

$2A=\begin{bmatrix}3 & 3\\ -3 & 7\end{bmatrix} \Rightarrow A=\frac{1}{2}\begin{bmatrix}3 & 3\\ -3 & 7\end{bmatrix}$

$A=\begin{bmatrix}3/2 & 3/2\\ -3/2 & 7/2\end{bmatrix}$

$A=\begin{bmatrix}3/2 & 3/2\\ -3/2 & 7/2\end{bmatrix}$ Ans

Now given:- $A+B=\begin{bmatrix}3 & 1\\ -7 & 4\end{bmatrix}$

$\Rightarrow B=\begin{bmatrix}3 & 1\\ -7 & 4\end{bmatrix}-A$

$\Rightarrow B=\begin{bmatrix}3 & 1\\ -7 & 4\end{bmatrix}-\begin{bmatrix}3/2 & 3/2\\ -3/2 & 7/2\end{bmatrix}$

$\Rightarrow B=\begin{bmatrix}3-3/2 & 1-3/2\\ -7-(-3/2) & 4-7/2\end{bmatrix}$

$\Rightarrow B=\begin{bmatrix}3/2 & -1/2\\ -11/2 & 1/2\end{bmatrix}$ Ans

$-7+\frac{3}{2}$

Matrix

Ques:- $3\begin{bmatrix} x & 4 \\ y-2 & 1 \end{bmatrix} + \begin{bmatrix} 2 & 4 \\ 1 & 2 \end{bmatrix} = \begin{bmatrix} 10 & 16 \\ 15 & 5 \end{bmatrix}$

(A) (B) (C)

Find x & y = ?

Sol:- given:- $3A + B = C$

$$\Rightarrow \begin{bmatrix} 3x & 12 \\ 3y-6 & 3 \end{bmatrix} + \begin{bmatrix} 2 & 4 \\ 1 & 2 \end{bmatrix} = \begin{bmatrix} 10 & 16 \\ 15 & 5 \end{bmatrix}$$

$$\Rightarrow \begin{bmatrix} 3x+2 & 12+4 \\ 3y-6+1 & 3+2 \end{bmatrix} = \begin{bmatrix} 10 & 16 \\ 15 & 5 \end{bmatrix}$$

$$\Rightarrow \begin{bmatrix} 3x+2 & 16 \\ 3y-5 & 5 \end{bmatrix} = \begin{bmatrix} 10 & 16 \\ 15 & 5 \end{bmatrix}$$

∵ Both Matrix are equal

∴ Corresponding Elements will also become equal.

Sol:- $3x+2 = 10$ | $3y-5 = 15$

$3x = 10-2 = 8$ | $3y = 15+5 = 20$

$3x = 8$ | $y = 20/3$ Ans

$x = 8/3$ Ans

Matrix

Multiplication of Matrices :-

Ex :- $\underset{A}{\begin{bmatrix} 1 & 3 \\ 5 & 2 \end{bmatrix}_{2\times2}} \begin{bmatrix} 2 \\ 5 \end{bmatrix}_{2\times1} = ? \Rightarrow \underset{A}{\begin{bmatrix} 17 \\ 20 \end{bmatrix}_{2\times1}} = \begin{bmatrix} 1\times2+3\times5 \\ 5\times2+2\times5 \end{bmatrix}$

A B

$\begin{bmatrix} 3 & 2 \\ 1 & 5 \\ 7 & 6 \end{bmatrix}_{3\times2} \begin{bmatrix} 2 & 7 \\ 4 & 3 \end{bmatrix}_{2\times2}$

Does A·B possible

2 = 2

A·B = order

3×2

items A × Cost B = Total Amount

$\begin{bmatrix} 5 & 10 \\ 4 & 8 \end{bmatrix}_{2\times2} \begin{bmatrix} 5 \\ 20 \end{bmatrix}_{2\times1\text{ Column}} = \begin{bmatrix} 225 \\ 180 \end{bmatrix}_{2\times1} = \begin{matrix} 5\times5+10\times20 \\ 4\times5+8\times20 \end{matrix}$

Row

AB = C

Condition :-

2 = 2 ✓

i) A·B ⇒ no. of Column of A = no. of Row of Matrix B. → i.e. we can multiply

ii) Result of Matrix A·B = have order ⇒ no. of Row of Matrix A × no. of Column of Matrix B

2×1