

Matrix operations,

5

1- Addition of Matrices,

If $A = [a_{ij}]_{m \times n}$ and $B = [b_{ij}]_{m \times n}$ are two matrices of the same order then their sum $A+B$ is a matrix, and each element of that matrix is the sum of the corresponding elements, i.e.

$$A+B = \begin{bmatrix} a_{11}+b_{11} & a_{12}+b_{12} & \dots & a_{1n}+b_{1n} \\ a_{21}+b_{21} & a_{22}+b_{22} & \dots & a_{2n}+b_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{m1}+b_{m1} & a_{m2}+b_{m2} & \dots & a_{mn}+b_{mn} \end{bmatrix}_{m \times n}$$

Ex if $A = \begin{bmatrix} 3 & 2 \\ 6 & 1 \end{bmatrix}_{2 \times 2}$; $B = \begin{bmatrix} 4 & 3 \\ 2 & 0 \end{bmatrix}_{2 \times 2}$

Find $A+B$

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$$A+B = \begin{bmatrix} \quad & \quad \\ \quad & \quad \end{bmatrix} + \begin{bmatrix} \quad & \quad \\ \quad & \quad \end{bmatrix} = \begin{bmatrix} 7 & 5 \\ 8 & 1 \end{bmatrix}$$

Ex if $w = \begin{bmatrix} 1 & 6 & 12 \\ 7 & 0 & 20 \end{bmatrix}$; $A = \begin{bmatrix} 3 & 3 & 3 \\ -6 & 2 & 30 \end{bmatrix}$

Find $w+A$

$$w+A = \begin{bmatrix} 4 & 9 & 15 \\ 1 & 2 & 50 \end{bmatrix}$$

h.w Ex If $A = \begin{bmatrix} 1 & 5 & -3 \end{bmatrix}$; $B = \begin{bmatrix} -10 & 2 & 0 \end{bmatrix}$

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

Find 1- $A+B$

2- $C+A$ under find multiply

2- Subtraction of Matrices

If A and B are two matrices of the same order, then we define

$$A - B = A + (-B)$$

$$= \begin{bmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{m1} & a_{m2} & \dots & a_{mn} \end{bmatrix} + \begin{bmatrix} -b_{11} & -b_{12} & \dots & -b_{1n} \\ -b_{21} & -b_{22} & \dots & -b_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ -b_{m1} & -b_{m2} & \dots & -b_{mn} \end{bmatrix}$$

$$= \begin{bmatrix} a_{11} - b_{11} & a_{12} - b_{12} & \dots & a_{1n} - b_{1n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{m1} - b_{m1} & a_{m2} - b_{m2} & \dots & a_{mn} - b_{mn} \end{bmatrix}$$

* Multiplication of Matrix

① Scalar Multiplication of Matrices

If $A = [a_{ij}]_{m \times n}$ is a matrix and k , any number, then the matrix which is obtained by multiplying the elements of A by k , is called scalar multiplication of A by k , and it is denoted by

$$k \cdot A_{m \times n}$$