Matrices:

In mathematics, a **matrix** is a rectangular array or table of numbers, symbols, or expressions, arranged in rows and columns, which is used to represent a mathematical object or a property of such an object.

For example, $\begin{bmatrix} 1 & 3 & 6 \\ 6 & 7 & 3 \end{bmatrix}$

is a matrix with two rows and three columns. This is often referred to as a "two by three matrix", a "2×3-matrix", or a matrix of dimension 2×3.

Types of Matrices

- Row Matrix
- Column Matrix
- Singleton Matrix
- Rectangular Matrix
- Square Matrix
- Identity Matrices
- Null Matrix
- Diagonal Matrix

Row Matrix:

A matrix is said to be row matrix if $A = [a_{ij}]_{m\times n}; \quad m = 1, \quad n \in N.$

Eg- $\begin{bmatrix} 1 & 2 & 5 \end{bmatrix}_{1\times3}$

Column Matrix:

A matrix is said to be column matrix if $A = [a_{ij}]_{m\times n}; \quad n = 1, \quad m \in N.$

Eg- $\begin{bmatrix} 1 \\ 2 \\ 4 \end{bmatrix}_{3\times1}$

Singleton Matrix:

A matrix is said to be singleton matrix if $A = [a_{11}]_{m\times n}; \quad \forall\, m, n.$

Eg- $[1]_{1\times1}$

Rectangular Matrix:

A matrix is said to be Rectangular matrix iff $A = [a_{ij}]_{m\times n}; \quad m \neq n.$

Eg- $\begin{bmatrix} 1 & 2 \\ 4 & 6 \\ 6 & 5 \end{bmatrix}_{3\times2}$ and $\begin{bmatrix} 1 & 3 & 8 \\ 3 & 9 & 0 \end{bmatrix}_{2\times3.}$

Square Matrix:

A matrix is said to be Square matrix iff $A = [a_{ij}]_{m\times n}; \quad m = n.$

Eg- $\begin{bmatrix} 1 & 2 & 5 \\ 9 & 0 & 8 \\ 4 & 8 & 6 \end{bmatrix}_{3\times3}$.

Identity Matrix:

A Square matrix is said to be identity matrix if $A = [a_{ij}]_{m\times n}$; $a_{ij} = 1$ *whenever* $i = j$ *and* $a_{ij} = 0$ *whenever* $i \neq j$.

Eg- $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}_{3\times3}$.

Null Matrix:

A square matrix is said to be Null matrix $A = [a_{ij}]_{m\times n}$; $a_{ij} = 0 \; \forall \; i, j$.

Eg- $\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}_{3\times3}$.

Diagonal Matrix:

A square matrix is said to be Diagonall matrix $A = [a_{ij}]_{m\times n}$; $a_{ij} = 0$ *whenever* $i \neq j$.

Eg- $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 8 & 0 \\ 0 & 0 & 6 \end{bmatrix}_{3\times3}$.