Matrix

A matrix is a rectangular array of numbers, symbols, arranged in rows and columns.

Example

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

Dimensions/order of matrix

Order of matrix = No. of Rows × No. of Columns

Example

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

No. of Rows = 2

No. of columns = 3

So

order = 2 × 3

or

2-by-3

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

No. of Rows = 3

No. of columns = 2

So

order = 3 × 2

or

3-by-2

Types of Matrix

On this, we will discuss different types of matrices.

(1) Row Matrix

A matrix with only one row.

Example

$$\begin{bmatrix} 1 & 2 & 3 \end{bmatrix} \rightarrow \text{order} = 1 \times 3$$

$$\begin{bmatrix} a & b & c \end{bmatrix} \rightarrow \text{order} = 1 \times 3$$

(2) Column Matrix

A matrix with only one column.

$$\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} \rightarrow \text{order} = 3 \times 1$$

$$\begin{bmatrix} 2 \\ 4 \end{bmatrix} \rightarrow \text{order} = 2 \times 1$$

(3) Square matrix

A matrix with an equal number of rows and columns.

$$\begin{bmatrix} 4 & 3 \\ 2 & 1 \end{bmatrix} \quad \text{order} = 2 \times 2$$

$$\begin{bmatrix} 3 & 1 & 2 \\ 7 & 9 & 6 \\ 1 & 4 & 3 \end{bmatrix} \quad \text{order} = 3 \times 3$$

Null Matrix or Zero Matrix.

A Matrix that has all its elements zero.

$$\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix} \qquad \text{order} = 2 \times 2$$

$$\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix} \qquad \text{order} = 2 \times 3$$

Diagonal Matrix

A square matrix that has all its elements zero except for those in the diagonal from top left to bottom right which is diagonal matrix.

$$\begin{bmatrix} 3 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

Scalar Matrix:

A diagonal elements where all the diagonal elements are equal.

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \qquad \text{order} = 3 \times 3$$

$$\begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix} \qquad \text{order} = 2 \times 2$$

Unit Matrix

A diagonal Matrix whose elements in the diagonal are all ones.

Example

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \rightarrow \text{order} = 3 \times 3$$

$$\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \rightarrow \text{order} = 2 \times 2$$