Matrices

Concept

Matrices and their Types

- Elements (numbers) arranged in following rows and columns and enclosed by square brackets [ ], or large parentheses ( ) or double bars ‖ ‖ is called matrix.
- **Matrix:** Matrix is defined as rectangular array of elements arranged in rows and columns. Its general form is
- $$A = \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ \vdots & \vdots & & \vdots \\ \vdots & \vdots & & \vdots \\ a_{m1} & a_{m2} & & a_{mn} \end{bmatrix}$$

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- This is matrix of m rows and n columns. It is denoted by (a_{ij}) and is read m by n.
- The first subscript refers to the number of rows and second refers to number of column to which the element belongs. Thus, a_{23} refers to element in second row and third column.
- **Order of Matrix:** If the matrix has total number of mn elements, arranged in m rows and n columns, it is said to be of order of m by n order, which often written as $m \times n$.

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- **Important to Remember**:

1. The matrix is not just aggregate of numbers; because in given matrix each element has its assigned position in particular row and column. For example,

Matrix $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ *is not same as* $\begin{vmatrix} 3 & 2 \\ 1 & 4 \end{vmatrix}$

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2. Matrix A = Matrix B only if both the matrices are of same order and each element of matrix A is equal to corresponding element of matrix B.

   If A = $\begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix}$ and B = $\begin{bmatrix} b_{11} & b_{12} \\ b_{21} & b_{22} \end{bmatrix}$

then A = B if and only if $a_{11} = b_{11}, a_{12} = b_{12}$ $a_{21} = b_{21}$, and $a_{22} = b_{22}$

3. A matrix of m rows and n columns is called $m \times n$ matrix.
4. If $m = n$, then it is square matrix.

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5. If the matrix consists of only one column, it is called column matrix. For example, A is column matrix

$$A = \begin{bmatrix} a \\ b \\ c \end{bmatrix}$$

6. If the matrix consists of only one row, it is called row matrix. For example, A is row matrix

$$A = \begin{bmatrix} a & b & c \end{bmatrix}$$

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7. If each element of a matrix is zero, it is called null matrix.

$$A = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$$

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THANK YOU