Matrix Formula

What is the Matrix?

Matrix is a way of arrangement of numbers, expressions, and symbols, in different rows and columns. Matrix formulas are used to solve the set of linear equations and calculus. If the two matrices are of the same size as their rows and columns, then we can them and subtract also. Matrices are one of the most useful tools in mathematics as well as in various areas of science like cryptography, genetics, economics, sociology, modern psychology, etc.

$$\begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{m1} & a_{m2} & \cdots & a_{mn} \end{bmatrix}$$

Some Important Matrix Formula

1] Transpose of Matrix

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

is a matrix then it's transpose martis is

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

2] Zero matrix is represented as 2 X 2 order

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

3] Unit matrix' representation as 3X 3 order

$$= \begin{bmatrix} a & b & c \\ m & n & o \\ p & q & r \end{bmatrix}$$

4] Addition of two matrices

Two matrices of same order can be added and will give result od same order matrix.

$$A = \begin{bmatrix} a_1 & b_1 \\ c_1 & d_1 \end{bmatrix} \quad \&$$

$$B = \begin{bmatrix} a_2 & b_2 \\ c_2 & d_2 \end{bmatrix} \quad \text{then}$$

$$A + B = \begin{bmatrix} a_1 + a_2 & b_1 + b_2 \\ c_1 + c_2 & d_1 + d_2 \end{bmatrix}$$

5] Multiplication of a matrix by a constant

$$\text{If,} A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$$

Then multillyig the A matrix by a constatnt k will give ,

$$\begin{bmatrix} ka & kb \\ kc & kd \end{bmatrix}$$

6] Multiplication of two matrices

Two matrices A and B can be multiplied if order of first one is mXn and second one is nXp. It will give result matric of order mXp.

$$A = \begin{bmatrix} a_1 & b_1 \\ c_1 & d_1 \end{bmatrix} \quad \&$$

$$B = \begin{bmatrix} a_2 & b_2 \\ c_2 & d_2 \end{bmatrix} \quad \text{then}$$

$$AXB = \begin{bmatrix} a_1a_2 + b_1c_2 & a_1b_2 + b_1d_2 \\ c_1a_2 + d_1c_2 & c_1b_2 + d_1d_2 \end{bmatrix}$$

Multiplication of two matrices exists if Number of row of first matrix is equal to number of column to another matrix..

7] Determinant of a matrix

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

The determinant is,

$$| A | = (ad - bc)$$

8] Inverse of matrix

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

Then its inverse matrix will be represented as , A^{-1} . then

$$A^{-1} = \frac{1}{|A|} \begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$$

Solved Examples

Q. 1: Find out the determinant of the matrix:

$$\begin{bmatrix} -2 & 4 \\ 7 & 5 \end{bmatrix}$$

Solution: Determinant will be,

(-2 X 5) – (7 X 4)

i.e. -38