

2nd & 4th Sem Combined

13.04.2020 (1)

Paper: Maths

Topic: Revision - I (Matrix)

Let's recap.

The symbol of a matrix is box bracket

[ ]

It has dimension. To remember, we say RC  
R for row and C for column. The most common  
dimension is  $3 \times 3$  (3 by 3) - 3 rows and  
3 columns.

[ ]  
(3x3)

Rows are horizontal wide  $\longrightarrow$  while  
columns are vertical  $\downarrow$

Examples:

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix} (3 \times 3)$$

$$\begin{bmatrix} 2 & 1 & 3 \\ 1 & -2 & 5 \\ 4 & 3 & -1 \end{bmatrix} (3 \times 3)$$

$$\begin{bmatrix} 1 & -1 & 0 \\ -3 & 1 & 3 \\ -5 & 0 & 1 \end{bmatrix} (3 \times 3)$$

The above examples can be easily written in  
general form as:

$$\begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix} (3 \times 3)$$

$a_{11}$  means 1st Row 1st Column  
Similarly  $a_{33}$  means  
3rd Row 3rd Column.

Let

$$A = \begin{bmatrix} 2 & 5 \\ 3 & 4 \end{bmatrix} (2 \times 2)$$

$$\sim A = \begin{bmatrix} 3 & 0 & 0 & 0 \\ 2 & 1 & 0 & 0 \\ 5 & 2 & 4 & 0 \\ 1 & 3 & 2 & 2 \end{bmatrix} (4 \times 4)$$

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We may write the same in general form too:

$$A = \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} \quad X = \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} \quad \text{and} \quad C = \begin{bmatrix} c_1 \\ c_2 \end{bmatrix}$$

Types of Matrix:

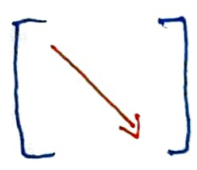
- 1. A matrix having equal dimension (Row = Column) - RC - is called SQUARE matrix. (2x2), (3x3), (4x4) ~~or (n x m)~~

$$\begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} \quad (2 \times 2)$$

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix} \quad (3 \times 3)$$

$$\begin{bmatrix} 1 & 2 & 3 & 4 \\ 5 & 6 & 7 & 8 \\ 9 & 10 & 11 & 12 \\ 13 & 14 & 15 & 16 \end{bmatrix} \quad (4 \times 4)$$

Principal Diagonal



- 2. Identity Matrix (also called Unit Matrix)

When all elements of Principal Diagonal are 1 and all other elements are zeros, it is called Identity Matrix or Unit Matrix. Identity matrix must always be square matrix. Equal dimension.  $R = C$ .

$$\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \quad (2 \times 2)$$

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \quad (3 \times 3)$$

$$\begin{bmatrix} 1 & 0 & \dots & 0 \\ 0 & 1 & \dots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \dots & 1 \end{bmatrix} \quad (n \times n)$$

Identity matrix is similar to the number 1 in ordinary algebra.

To be Contd...