SRM INSTITUTE OF SCIENCE AND TECHNOLOGY
Ramapuram Campus
FACULTY OF ENGINEERING AND TECHNOLOGY
Department of Mathematics

Odd Semester 2022 – 2023

Innovative Teaching Methods

21MAB101T – Calculus and Linear Algebra

Pedagogy 1 – Retrieval Practice

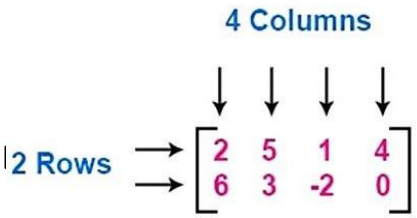
Retrieval practice is the act of trying to recall information without having it in front of you. It enhances mind and boosts learning.

Matrix

A matrix is a rectangular array of numbers.

$$\begin{array}{c} \\ 1 \\ 2 \\ 3 \\ \vdots \\ m \end{array} \begin{array}{c} \begin{array}{cccc} 1 & 2 & \dots & n \end{array} \\ \begin{bmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ a_{31} & a_{32} & \dots & a_{3n} \\ \vdots & \vdots & \vdots & \vdots \\ a_{m1} & a_{m2} & \dots & a_{mn} \end{bmatrix} \end{array}$$

Order of Matrix



Order = 2 × 4

Determinant of Matrix

$$|A| = \begin{vmatrix} a & b & c \\ d & e & f \\ g & h & i \end{vmatrix} = a\begin{vmatrix} e & f \\ h & i \end{vmatrix} - b\begin{vmatrix} d & f \\ g & i \end{vmatrix} + c\begin{vmatrix} d & e \\ g & h \end{vmatrix}$$

Matrix Addition

$$A+B=\begin{pmatrix}1 & 2\\ 3 & 4\end{pmatrix}+\begin{pmatrix}5 & 6\\ 7 & 8\end{pmatrix}=\begin{pmatrix}6 & 8\\ 10 & 12\end{pmatrix}$$

Matrix Subtraction

$$A+B=\begin{pmatrix}5 & 6\\ 7 & 8\end{pmatrix}-\begin{pmatrix}1 & 2\\ 3 & 4\end{pmatrix}=\begin{pmatrix}4 & 4\\ 4 & 4\end{pmatrix}$$

Matrix Multiplication

$$AB=\begin{pmatrix}1 & 2\\ 3 & 4\end{pmatrix}\begin{pmatrix}5 & 6\\ 7 & 8\end{pmatrix}=\begin{pmatrix}5+14 & 6+16\\ 15+28 & 18+32\end{pmatrix}=\begin{pmatrix}19 & 22\\ 43 & 50\end{pmatrix}$$

Types of Matrices

Row Matrix

$$\begin{pmatrix}a & b & c\end{pmatrix}$$

Column Matrix
Vector Matrix

$$\begin{pmatrix}a\\ b\\ c\end{pmatrix}$$

Zero Matrix
Null Matrix

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

Diagonal Matrix

$$\begin{pmatrix}a & 0 & 0\\ 0 & b & 0\\ 0 & 0 & c\end{pmatrix}$$

Scalar Matrix

$$\begin{pmatrix}a & 0 & 0\\ 0 & a & 0\\ 0 & 0 & a\end{pmatrix}$$

Unit Matrix

$$\begin{pmatrix}1 & 0 & 0\\ 0 & 1 & 0\\ 0 & 0 & 1\end{pmatrix}$$

Upper Triangular Matrix

$$\begin{pmatrix}a & b & c\\ 0 & d & e\\ 0 & 0 & f\end{pmatrix}$$

Lower Triangular Matrix

$$\begin{pmatrix}a & 0 & 0\\ b & c & 0\\ d & e & f\end{pmatrix}$$

Symmetric

$A^T = A$

$$\begin{bmatrix}1 & 1 & -1\\ 1 & 2 & 0\\ -1 & 0 & 5\end{bmatrix}$$

Skew-symmetric

$A^T = -A$

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

Staff incharge **HOD / Mathematics**