20/1/08

Class note 2

Book to refer:

Introduction to linear algebra by Gilbert Strang

Problem to translate into eq

1. Price of 1 ball & 2 bats } 100 Rs
   or 2 ball & 1 bats

ans:-

$$1x + 2y = 100$$
$$2x + 1y = 100$$

$$\cancel{2x} + 4y = 200 \quad \times 2$$
$$\cancel{2x} + 1y = 100$$
$$3y = 100$$
$$\boxed{y = 33.3}$$

$$2x + 1y = 100$$
$$2x + 33.3 = 100$$
$$\boxed{x = 33.35}$$

Converting to matrix

Eg:-

$$1x + 2y + 2z = 100$$
$$2x + y + 2z = 200$$
$$x + 2y + 4z = 300$$

diagonal

$$\begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 1 & 2 & 4 \end{bmatrix} \quad \begin{bmatrix} x \\ y \\ z \end{bmatrix} \quad \begin{bmatrix} 100 \\ 200 \\ 300 \end{bmatrix}$$

3×3 $\quad$ 3×1 $\quad$ 3×1 $\Rightarrow$ order

Types of matrix

*** Row Matrix :-**

A matrix is said to be a row matrix if has only one row

Eg :- $A = [\,1 \;\; 2 \;\; 2\,]$

*** Column matrix :-**

if it has one column.

$$A = \begin{bmatrix} 1 \\ 2 \\ 1 \end{bmatrix}$$

*** Rectangular Matrix :-**

if no of rows not equal to no columns.

$$A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \end{bmatrix}$$

*** Square Matrix :-**

if no of rows equal to no columns

$$A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 1 & 2 & 4 \end{bmatrix}$$

Scanned by CamScanner

* Diagonal Matrix:-

A square matrix is said to be diagonal if at least one element of principal diagonal is non-zero & all other elements are zero

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

* Scalar Matrix:-

if all the diagonal elements are same

$$A = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 2 \end{bmatrix}$$

* Triangular Matrix:-

A square matrix is said to be triangular if all of its elements below the principal diagonal are zero (lower triangular matrix) (or) all of its elements above the principal diagonal are zero (upper triang- matrix)

(i) lower triangular matrix

$$A = \begin{bmatrix} 1 & 0 & 0 \\ 2 & 4 & 0 \\ 3 & 5 & 6 \end{bmatrix}$$

(ii) Upper triangular matrix

$$A = \begin{bmatrix} 5 & 8 & 3 \\ 0 & 1 & 2 \\ 0 & 0 & 7 \end{bmatrix}$$

* Identity (or) Unit Matrix:

A diagonal Matrix is a said to be identity if all its diagonal elements are one, denoted by I

$$I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \text{ or } \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

* Null matrix:-

if all the matrix are zero, denoted by O

$$O = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix} \text{ (or) } \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

* Transpose of Matrix:-

let A is a matrix, then the matrix obtained by interchanging its row into columns is called the transpose of A & denoted by A^t.

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 8 & 4 & 6 \end{bmatrix}$$

$$A^t = \begin{bmatrix} 1 & 8 \\ 2 & 4 \\ 3 & 6 \end{bmatrix}$$

Vector space:-

Vector (v) is defined on a field (F), it is defined such that it satisfies all the axioms

Eg:- natural no

The set V is defined to be a Vector space, when for every vector u, v, & w in V & every scalar c & d

Properties :-

1. $u+v$ is in V -- Closure under addition
2. $u+v=v+u$ -- Commulative property
3. $u+(v+w)=(u+v)+w$ -- Associative property
4. $u+0=u$ -- Additive identity
5. $u+(-u)=0$ -- Additive inverse
6. cu is in V -- closure under multiplication
7. $c(u+v)=cu+cv$ Distributive property
8. $c(du)=cdu$ Associative property
9. $1(u)=u$ sclar identity

properties of scalar multiplication

v is a element of a Vector space V, & c is a scalar, if

* $0v=v$
* $c0=0$
* if $cv=0$ then $c=0$ (or) $v=0$
* $(-1)v=-v$

A non empty subset of a vector space V is called a sub space of W, if V is closed under the operation of addition & scalar multiplication defied for V