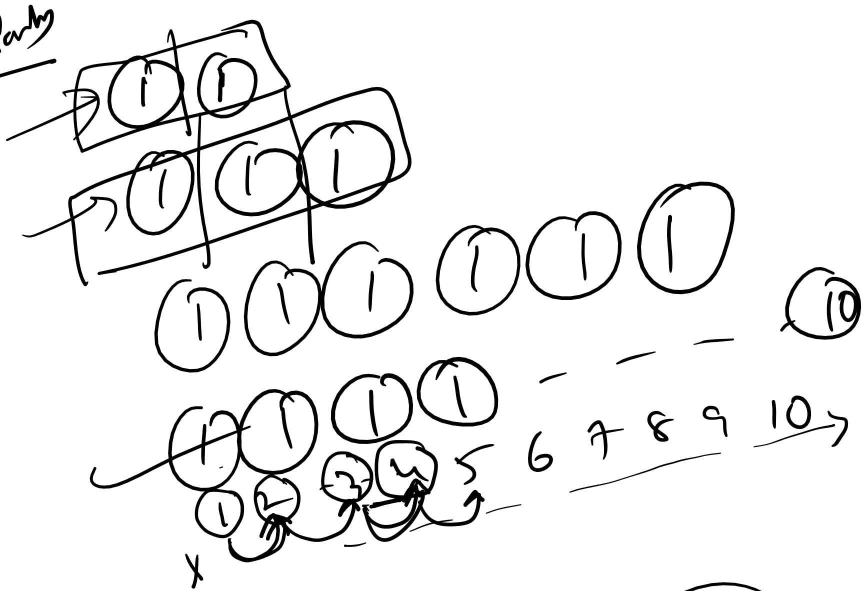
9062395123

1. $y = \alpha + \beta x_1$
2. $y = \alpha + \beta_1 x_1 + \beta_2 x_2$
3. $y = \alpha + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3$
96. $y = \alpha + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_{96} X_{96}$

New year Party



★ Linear dependence → One is scalar multiple of other

Vector set → linearly dependent structure

$V_3(\mathbb{R})$ → field of Real Numbers

G → R → F

$\left\{ (2,1,2), (8,4,8) \right\}$

$\left\{ (1,2,0), (0,3,1), (-1,0,1) \right\}$

$\alpha(1,2,0) + \beta(0,3,1) + \gamma(-1,0,1) = (0,0,0)$

$\alpha - \gamma = 0$

$2\alpha + 3\beta = 0$

$\beta + \gamma = 0$

$\boxed{\alpha = \beta = \gamma = 0}$

Linearly Independent

Basis of a vector space

Consisting of all linearly independent vectors

Dimension → No of elements in any Basis of a finite dimensional VS

$\dim(W_1 + W_2) = \dim(W_1) + \dim W_2 - \dim(W_1 \cap W_2)$

Spcl Rules for MCQ Based exams

① Dimension of a vector space $m \times n$ matrix ($r \times c$)

Σ Row $= 0$ ⇒ $(mn - 1)$

(I) Dimension of a vec...
whose $\sum \text{Row no. 1} = 0 \Rightarrow (mn - 1)$

whose $\sum$ each Row $= 0 \Rightarrow mn - m$

(II) whose $\sum$ each Column $= 0 \Rightarrow mn - n$

(III) whose $\sum$ each Row & Column $\Rightarrow 0$

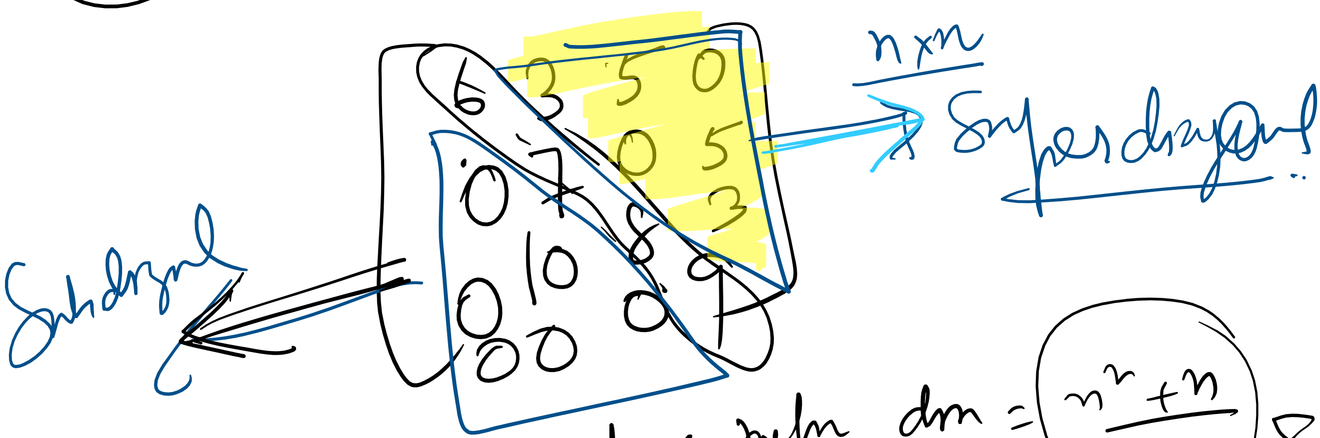
(IV) $(mn - m - n + 1)$

(V) $n \times n$ matrix all diagonal $\Rightarrow 0$

$\boxed{\dim = n}$

(VI) $n \times n$ Scalar matrices $\boxed{\Rightarrow \dim = 1}$

(VII) $n \times n$ ~~triangular~~ Tri-diagonal matrix $= (3n - 2)$



(VIII) $n \times n$ symmetric matrix dim $= \dfrac{n^2 + n}{2}$

(IX) $n \times n$ skew ~ ~ dim $\dfrac{n^2 - n}{2}$

(X) Upper triangular / Lower triangular $= \dfrac{n^2 + n}{2}$

(XI) dim(null matrix) $= 0$

Q1 dim(null matrix) = 0

$$W_1 = \begin{pmatrix} a & -a \\ c & d \end{pmatrix} \qquad W_2 = \begin{pmatrix} a & -b \\ -a & d \end{pmatrix}$$

$m = \dim(W_1 \cap W_2)$ then $(m, n) = ??$

$n = \dim(W_1 + W_2)$

1 1 1 1 1 1

Netflix → Prime

Apple TV+ → Scaler

Hotstar

1–4

5–8

Masters of the Air

5 7

$$W_1 + W_2 = \begin{pmatrix} 2a & -a-b \\ c-a & 2d \end{pmatrix} \Rightarrow 4$$

$$W_1 \cap W_2 = (W_1) + W_2 - (W_1 + W_2)$$
$$= (4-1) + (4-1) - 4$$
$$= 6 - 4 = 2$$

$$\left.\begin{matrix} m = 2 \\ n = 4 \end{matrix}\right\}$$

** $M_5(\mathbb{R})$ vector space 5×5

→ All Real Entries

$M_5(\mathbb{R})$ Space of ... symmetric ...

$W \subset M_5(\mathbb{R})$ Subspace of Skew symmetric matrices

find dimension of W.

~~Sol~~ Ans:

$n = 5$

$\dim = \frac{5 \times 4}{2} = 10$

$\frac{n(n-1)}{2}$

Q. which is a 2D subspace of $\mathbb{R}^3$ over $\mathbb{R}$.

× a) $\{(0, x, 0) \mid x \in \mathbb{R}\}$

× b) $\{(0, x, 0) \mid x \in \mathbb{R}\} \cup \{(0, 0, y) \mid y \in \mathbb{R}\}$

× c) $\{(x, y, 0) \mid x, y \in \mathbb{R} \ \& \ x + y = 0\} \to y = -x$

$\{x, -x, 0\} \to$ 1D

d) $\{(0, x, z) \mid x, z \in \mathbb{R}\}$

$(0, 1, 0) + (0, 0, 1) \to (0, 1, 1) \notin W_2$

$\in W_2$ $\quad \in W_2$

1, 2, 3, 4 ---- $U_n = n$

2, 4, 6 ---- $U_n = 2n$

3, 6, 9 ---- $U_n = 3n$

IIT - Jam

2017

$6 \times 6 \to$ subspace of Symmetric

$6 \times 6 \to$ subspace of (symmetric ...)

$$\frac{n(n+1)}{2} \Rightarrow \frac{6 \times 7}{2} = 21$$

Dimension of Subspace $\{(x_1, x_2, x_3, x_4, x_5) : 3x_1 - x_2 + x_3 = 0\}$ of R^5

$\boxed{1/2/3/4}$?

$3x_1 - x_2 + x_3 = 0$

$$\boxed{x_2 = 3x_1 + x_3}$$

Any $(x_1, x_2 \ldots x_5) \in W$ can be written as

$(x_1, 3x_1 + 1x_3, 1x_3, x_4, x_5) = x_1 (1,3,0,0,0) + x_3(0,1,1,0,0)$
$+ x_4(0,0,0,1,0) + x_5(0,0,0,0,1)$

These 4 span W &
W is linearly Independent. $\to$ 4

$$A = \begin{bmatrix} 1 & 1 & 1 \\ 2 & 2 & 3 \\ x & y & z \end{bmatrix} \qquad V = \{(x,y,z) \in R^3 ; \det(A) = 0\}$$

0/1/2/3

$A = \begin{bmatrix} \; & \; & \; \\ x & y & z \end{bmatrix}$

Then $\dim(V) = ?$

$\boxed{0/1/2/3}$

$x - y - z$

$$|A| = \begin{vmatrix} 1 & 1 & 1 \\ 2 & 2 & 3 \\ x & y & z \end{vmatrix} = 2z + 2y + 3x - 2x - 3y - 2z$$

$$= x - y$$

$V = \{ (x, y, z) \in \mathbb{R}^3 ; \det(A) = 0 \}$

$\boxed{x = y}$ $\quad V = \{ x, x, z \}$

$$\boxed{\dim(V) = 2}$$