linear independence

Vectors u v w

تكتب lc حقق وحدة من الإثنين
الباقين لو تقدر فحنقول عنه
liner dependent
لو ما تقدر فحنقول عنه
linear independent

Same test of the Span <u>but</u> After writing the Vector equation we'll equal it to <u>ZERO</u>

$$K_1V_1 + K_2V_2 = 0$$

→ homogenus equation
Always Consistent

independent

$K_1 = K_2 \ldots\ldots K_n = 0$

Trivial Solution

dependent

$K \neq 0$

non Trivial

example: $V_1=(1,-2,3)$ $V_2=(5,6,-1)$

$V_3=(3,2,1)$

dependent or independent in $\mathbb{R}^3$?

1) $k_1V_1+k_2V_2+k_3V_3=0$ → Matrix $\begin{bmatrix}0&0\\0&0\end{bmatrix}$ ordered Pairs $(0,0)$

2) $k_1(1,-2,3)+k_2(5,6,-1)+k_3(3,2,1)=(0,0,0)$

3) $(k_1,-2k_1,3k_1)+(5k_2,6k_2,-k_2)+(3k_3,2k_3,k_3)=(0,0,0)$

4) $(k_1+5k_2+3k_3,\ -2k_1+6k_2+2k_3,\ 3k_1-k_2+k_3)=(0,0,0)$

$$
\begin{aligned}
k_1+5k_2+3k_3&=0\\
-2k_1+6k_2+2k_3&=0\\
3k_1-k_2+k_3&=0
\end{aligned}
$$

det
Only for square Matrices

det = 0 → "dependent" Non Trival

det ≠ 0 → "independent" Trival

Augumented Matrices ← مع الثوابت وكلو

→ Gauss "REF"

$k_1=2$ $k_2=5$ $k_3=0$ → dependent Non Trival

$k_1=0$ $k_2=0$ $k_3=0$ → independent "Trival" zero Vector $\Rightarrow (0,0)$ or $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix} \Longrightarrow$ linearly dependent

Studying only one Vector $\Longrightarrow$ linearly independent

If Vectors are Scalerly muliple of each other $\rightarrow$ linearly dependent

example: $u_1 = (-1, 2, 4)$ $\quad u_2 (5, -10, -20)$

$u_1 = 5(-1, 2, 4) = u_2$ "$(5, -10, -20)$"

If the numbers of the Vectors > degree of the subset

= linearly dependent

$\therefore \quad R^2 \rightarrow u_1\ u_2\ u_3$ linearly dependent

$P^2 \rightarrow$ ____ ____ ____ ____ linearly dependent