• 
$$A_1 x + B_1 y = C_1$$
  
 $A_2 x + B_2 y = C_2$ 

$$\frac{A_1}{A_2} \neq \frac{B_1}{B_2}$$

1 unique solution

utions 3. No Solution
$$\frac{A_1}{A_2} = \frac{B_1}{B_2} \neq \frac{C_1}{C_2}$$

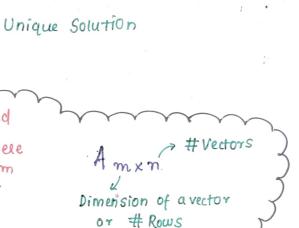
Ques: 
$$2x+y=2$$
  
 $x-y=3$ 
Ax=b.

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

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

$$\begin{bmatrix} 2 & 1 \\ 1 & -1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 2 \\ 3 \end{bmatrix}$$

$$Ax = b \text{ has a solution if and}$$



only if 
$$b \in \text{span}(v_1, \dots, v_n)$$
 where  $v_i \in \mathbb{R}^m$ 

OR

 $b \in \text{Linear Combination}$ 

of  $\{v_1, v_2, \dots, v_n\}$ 

b is linearly dependent on 
$$\{V_1, V_2, \dots, V_n\}$$

$$\partial \alpha + \alpha = 0$$

OR.

Eq: 
$$2x+y=2$$

$$x-y=3$$

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

Q 2x+4y=6  $\begin{bmatrix} 2 \\ 4 \end{bmatrix} \begin{bmatrix} 4 \\ 8 \end{bmatrix} \begin{bmatrix} 6 \\ 10 \end{bmatrix}$ 4x + 8y = 10. Aug. Matalix - [A:B] No Solution Exist Kabhi bhi pivot element original matulik ki bahas Jis bhi column nahi jaana chahiye, in this mein pivot element case, we can see prot etement (-2) -aa uaha hain is ourside the original maturix, woh Lineally so, > No Solution. Independent Vector hota hain. Echleon form, Ax = bb =0 Non-homogeneous Homogeneous System System EQUATIONS :-System to Homogeneous AX = 0will One Solytion, always exist for the Homogeneous eg: 2x + 3y = 0 system of equations. 2x + 5y = 0i.e. No of variables = 0 Que: A = [aij] mxn Sol? VielRm  $\begin{bmatrix} v_1 & v_2 & v_3 & \dots & v_n \end{bmatrix}$ P(A) = n=> Unique Solution Discuss about the (All variables solution, nature of UNIQUE can also say SOLUTION. "Trivial Solution".

$$Q = A = [a_{ij}] m \times n$$

$$P(A) = m \qquad opely$$

$$many \qquad p(A) = m \leq min(m,n)$$

$$many \qquad solutions$$

$$There will always be some dependent vectors!!$$

$$\begin{bmatrix} 2 & 5 & 8 & 10 \\ 3 & 6 & 9 & 12 \\ 4 & 7 & 10 & 19 \end{bmatrix}$$

$$\underbrace{\xi g} : \begin{bmatrix} 2 & 4 & 8 \\ 3 & 5 & 11 \end{bmatrix} \begin{bmatrix} 2 \\ 3 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

$$\begin{bmatrix} 2 & 4 & 8 \\ 0 & (-1) & -1 \end{bmatrix}$$

Echleon

$$\begin{bmatrix} 2 & 4 & 8 \\ 0 & -1 & -1 \end{bmatrix} \qquad 2 \begin{bmatrix} 2 \\ 3 \end{bmatrix} + 1 \begin{bmatrix} 4 \\ 5 \end{bmatrix} = \begin{bmatrix} 8 \\ 11 \end{bmatrix}$$

there Here, we can see are many possibilities for x any y overy many solutions.

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0

0

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$$2\begin{bmatrix} 2 \\ 3 \end{bmatrix} + 1\begin{bmatrix} 4 \\ 5 \end{bmatrix} - 1\begin{bmatrix} 8 \\ 11 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

$$4\begin{bmatrix} 2 \\ 3 \end{bmatrix} + 2\begin{bmatrix} 4 \\ 5 \end{bmatrix} - 2\begin{bmatrix} 8 \\ 11 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

$$4\begin{bmatrix} 3 \\ 3 \end{bmatrix} + 2\begin{bmatrix} 4 \\ 5 \end{bmatrix} - 2\begin{bmatrix} 8 \\ 11 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

