

Vectors, Matrices, Row reduction Linear Systems of Equations  $a_{1}x_{1}+\ldots+a_{1}x_{n}=b_{1}$ h variables m equations  $a_2, x_1 + \ldots + a_m x_n = b_2$  $\cdots + a_{mn} x_n = b_m$ a 2, + an are ay the coefficients. X, -... Xn one the variables by on the coefficients by pumselves.

2 variables	2 equation	- 5
3×+22 =	I	$A_{11} \times A_{12} \times A_{2} = b_{1}$
12 22 -	2	Q2, X1 + Q22 X2 - b2

$$3x + 2y = 1$$
  
 $-3x - 3y = b$   
 $5y = -5$   
 $y = -1$   
 $x - (-1) = 7$   
 $x = 1$ 

3×+22 =1 1x - by = 2  $\begin{bmatrix} 3 & 2 \\ 1 & -1 \end{bmatrix} \begin{bmatrix} 2 \\ 3 \end{bmatrix} = \begin{bmatrix} 2 \\ 2 \end{bmatrix}$ A z = b Linear System is matrix form mequations h variables mous n A mxn matrix

 $\begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1N} \\ \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots \\ a_{m1} & \cdots & a_{mn} \end{bmatrix} \begin{bmatrix} x_1 \\ \vdots \\ x_n \end{bmatrix} = \begin{bmatrix} b_1 \\ \vdots \\ b_m \end{bmatrix}$ mx1 y x 1 mxy

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

$$x - y = 2$$

$$A = 5$$
Definition  $4b = A\overline{x}$ 

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

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

$$In \quad general, \quad if \quad A \text{ is an maxn}$$

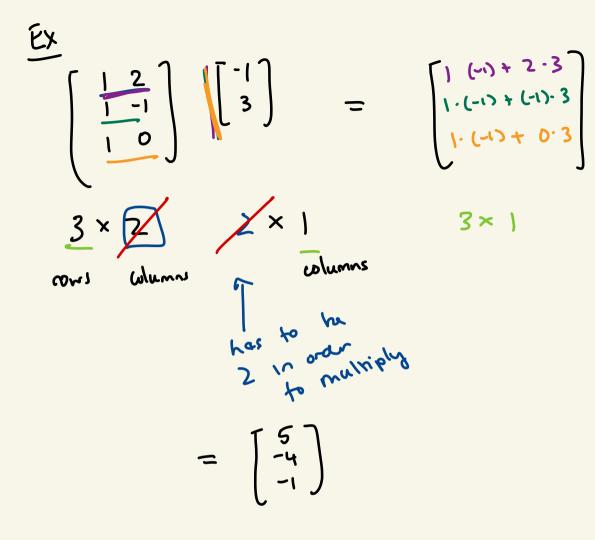
$$matrix \quad (m \text{ rows, n columns}) \quad Hen$$

$$Von \quad (a \quad multight \quad an \quad n-vector \ .$$

$$\vec{v} = (v_1, v_2, \dots, v_n) = \begin{bmatrix} v_1 \\ v_2 \\ \vdots \\ \vdots \\ \vdots \end{bmatrix}$$

In general, if A is an maxn  
matrix (mows, noblemns) then  
you can multiple an n-vector.  

$$V = (V_1, V_2, ..., V_n) = \begin{bmatrix} V_1 \\ V_2 \\ \vdots \\ V_n \end{bmatrix}$$
  
 $\begin{bmatrix} a_{11} - - a_{1n} \\ \vdots \\ a_{m1} - - a_{mn} \end{bmatrix} \begin{bmatrix} V_1 \\ \vdots \\ V_n \end{bmatrix}$   
 $\begin{bmatrix} a_{11} \cdot - - a_{1n} \\ \vdots \\ a_{m1} \cdot V_1 + a_{m1} \cdot V_n \end{bmatrix}$   
This the definition !



Next time Mostine Mulniplication Pour reduction Matrix Insuses.

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