Openfrons With Matrices x Ty 1 Truspose  $x^T = [123]$  $X = \begin{bmatrix} 2 \\ 3 \end{bmatrix}$ 1 \*3 exchange colours for vows (AT); = A;;

sumplies cols ad rows  $(A^T)_{23} = A_{32}$  $\begin{bmatrix} \frac{200}{410} \\ \frac{563}{3} \end{bmatrix} = \begin{bmatrix} 245 \\ 016 \\ 003 \end{bmatrix}$ lower trongular upper transular (all 0's above diapul)

$$\begin{bmatrix} a_1, \dots, a_k \end{bmatrix}^T = \begin{bmatrix} a_1^T \\ a_2^T \\ \vdots \\ a_k^T \end{bmatrix}$$

$$\begin{bmatrix} a_1^T \end{bmatrix}^T = \begin{bmatrix} a_1 & a_2 & \cdots & a_k \end{bmatrix}$$

$$(A^T)^T = A$$

$$\begin{bmatrix} A & B \end{bmatrix}^{T} = \begin{bmatrix} A^{T} & C^{T} \\ B^{T} & D^{T} \end{bmatrix}$$

Adding matrizes:

Sane shape MXM

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} + \begin{bmatrix} 9 & 0 & 7 \\ 2 & 0 & 6 \end{bmatrix} = \begin{bmatrix} 10 & 2 & 10 \\ 6 & 5 & 12 \end{bmatrix}$$

$$(A+B)_{ij} = A_{ij} + B_{ij}$$

Maltipliation by scalurs

$$2\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} = \begin{bmatrix} 2 & 4 & 6 \\ 8 & 10 & 12 \end{bmatrix}$$

d, 
$$CER$$
 A, B mxn matrices
$$c(A+B) = cA+cB$$

$$(c+d)A = cA+dA$$

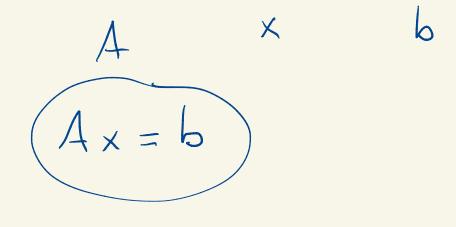
$$c(dA) = (cd)A$$

$$2a - 3b + 5c = 3$$

$$-a + b + 2c = 5$$

$$a \begin{bmatrix} 2 \\ -1 \end{bmatrix} + b \begin{bmatrix} -3 \\ 1 \end{bmatrix} + c \begin{bmatrix} 5 \\ 2 \end{bmatrix} = \begin{bmatrix} 3 \\ 5 \end{bmatrix}$$

$$\begin{bmatrix} 2 - 3 & 5 \\ -1 & 1 & 2 \end{bmatrix} \begin{bmatrix} a \\ b \\ c \end{bmatrix} = \begin{bmatrix} 3 \\ 5 \end{bmatrix}$$



Matrex - vector maltiplication

m [ must match

1) Colum perspective

 $\begin{bmatrix} a_1 & \cdots & a_n \end{bmatrix} \begin{bmatrix} x_1 \\ \vdots \\ x_n \end{bmatrix} = x_1 a_1 + x_2 a_2 + \cdots + x_n a_n$ 

$$\begin{bmatrix} 2 & -3 & 5 \\ -1 & 1 & 2 \end{bmatrix} \begin{bmatrix} 1 \\ 2 \\ 1 \end{bmatrix} = 1 \begin{bmatrix} 2 \\ -1 \end{bmatrix} + 2 \begin{bmatrix} -3 \\ 1 \end{bmatrix} + 1 \begin{bmatrix} 5 \\ 2 \end{bmatrix}$$
$$= \begin{bmatrix} 1 \\ 3 \end{bmatrix}$$

$$\begin{bmatrix} 2 & -3 & 5 \\ -1 & 1 & 2 \end{bmatrix} \begin{bmatrix} 1 \\ 2 \\ 1 \end{bmatrix} = \begin{bmatrix} (2, -3, 5)^{T} (1, 2, 1) \\ (-1, (, 2)^{T} (1, 2, 1)) \end{bmatrix}$$

$$= \begin{bmatrix} 1 \\ 3 \end{bmatrix}$$

$$(A \times)_{i} = \sum_{j=1}^{n} A_{ij} \times_{j}$$

$$M \times M$$

$$N = \sum_{j=1}^{n} A_{ij} \times_{j}$$

result: un-vector