Cdmn1 Colunz Colum3

Ras 1

Ras 2

4 5 3:

Pow3

Row4

O 3 9

The Colums

The Column

The

General Matrix Element a;

Ps. 923 = Rn2, column 3

(=3abre)

Usual Convention > use opper cone chanceles for an entire matrix ->

 $\widehat{A} = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$ 

I dontity Matrix :

## Matrix Algebra:

D'Addition and Subtraction

-> Can only add/Subtent
matrices if exactly the
Same shape!

) and I substant element by element.

Musti sticution

(i) by a Scalar

$$\begin{pmatrix}
a_{11} & a_{12} & a_{13} \\
a_{21} & a_{22} & a_{23}
\end{pmatrix}$$

$$= \begin{pmatrix}
ka_{11} & ka_{12} & ka_{23} \\
ka_{21} & ka_{22} & ka_{23}
\end{pmatrix}$$
Trultiply each denet by

the Scalar.

$$\begin{pmatrix}
2 & (3) \\
1 & 3 & 2
\end{pmatrix}$$
The matrices.

$$\begin{pmatrix} 2 & 3 \\ 1 & 3 \\ 0 & 2 \\ 3 & 0 \end{pmatrix} \times \begin{pmatrix} 1 & -1 & 0 & 2 & 5 \\ 2 & -2 & 0 & 1 & 1 \\ 3 & -3 & 0 & 5 & 2 \\ 3 & 0 & 1 & 1 \end{pmatrix}$$

milliply Rows of first Procedure:

matrix by curins of

Se und matrix.

2 13

= 13

I Start with first me, nultiply by each coloner

4) move to next rus ... continuo.

REQUIREMENT!

# of Lobomus

of rat makvix

= # of rows of

Secul matrix...

 $\hat{A} \cdot \hat{B} =$ 

C

$$(m \times p) \rightarrow (m \times p)$$

$$(4 \times 3) \cdot (3 \times 5) \Rightarrow 4 \times 5$$

$$(4 \times 3) \cdot (3 \times 5) \Rightarrow 4 \times 5$$

$$(n \times p) \rightarrow (n \times p)$$

$$(n \times p)$$

They might cut even be the same size!!

But, what if 
$$\widetilde{A} \rightarrow v_{X}v$$
 $\widetilde{B} \rightarrow v_{X}v$ 

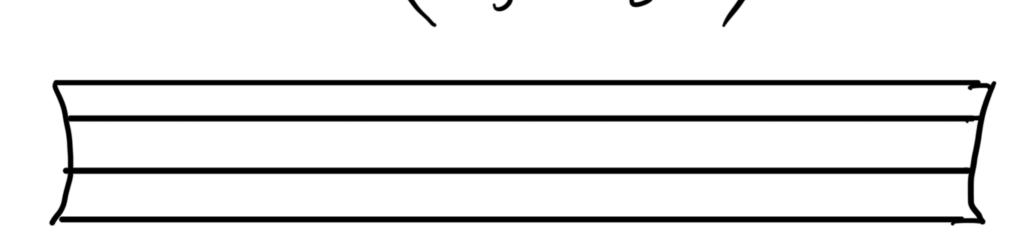
Then  $\widetilde{A} \cdot \widetilde{B}$  and  $\widetilde{B} \cdot \widetilde{A}$  are both  $v_{X}v$ .

But, still  $\widetilde{A} \cdot \widetilde{B} \neq \widetilde{B} \cdot \widetilde{A}$  in general!.

8.5.  $\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix} \begin{pmatrix} 4 & 3 \\ 2 & 1 \end{pmatrix}$ 

=  $\begin{pmatrix} 8 & 5 \\ 20 & 13 \end{pmatrix}$ 

=  $\begin{pmatrix} 13 & 20 \end{pmatrix}$ 
 $\begin{pmatrix} 13 & 20 \end{pmatrix}$ 
 $\begin{pmatrix} 13 & 20 \end{pmatrix}$ 



Questions: Are there situations when  $\widehat{A} \cdot \widehat{B} = \widehat{B} \cdot \widehat{A}$ ?

What are the properties /

Characteristics of  $\widehat{A}$  and  $\widehat{B}$  that would under

this the case?

We will come back to this leter, becare it towns cut that the answers. Ove really important implysics!!!