1. Order of a matrix 2. Addition & Subtraction 3. Scalar Multiplication 4. Matrix multiplication 5. Identity Matrix 6. Inverse of a matrix  $( \lambda_{\times} \lambda )$ 7. Finding X through matrix multiplication ( 8. Word problems

1. Order of a matrix # of Rows x # of Columns

$$A = \begin{bmatrix} 3 & -R_2 \\ 1 & -R_3 \end{bmatrix}$$

$$A = \begin{bmatrix} 3 & + R_2 \\ 1 & + R_1 \end{bmatrix}$$

$$B = \begin{bmatrix} 4 & 4 & 4 \\ 3 & 2 & 5 \\ R & 7 & 1 & -4 \end{bmatrix}$$

$$C = \begin{bmatrix} 5 \end{bmatrix}$$

$$2 \times 1$$

Column Matrix

$$D = \begin{bmatrix} 3 & -1 \\ 4 & 8 \end{bmatrix}$$

3x2

or more

or subtracted

2. Addition & Subtraction Two matrices can only be added if a only if the order is the same.

$$A = \begin{bmatrix} 3 & 5 \\ 1 & 8 \end{bmatrix}$$

$$A = \begin{bmatrix} 3 & 5 \\ 1 & 8 \end{bmatrix} \qquad B = \begin{bmatrix} 1 \\ 9 \end{bmatrix} \qquad C = \begin{bmatrix} 3 & -3 \\ -7 & 0 \end{bmatrix}$$

A+B = Not Possible

$$A+C = \begin{bmatrix} 3 & 5 \\ 1 & 8 \end{bmatrix} + \begin{bmatrix} 3 & -\lambda \\ 7 & 0 \end{bmatrix} = \begin{bmatrix} 3+3 & 5+-\lambda \\ 1+7 & 8+0 \end{bmatrix} = \begin{bmatrix} 6 & 3 \\ -6 & 8 \end{bmatrix}$$

$$k \begin{bmatrix} a & b \\ c & d \end{bmatrix} = \begin{bmatrix} ka & kb \\ kc & kd \end{bmatrix}$$

$$O A = \begin{bmatrix} S \\ -3 \end{bmatrix}$$
 find  $\partial A$ 

$$2\begin{bmatrix} 5 \\ -3 \end{bmatrix} = \begin{bmatrix} 10 \\ -6 \end{bmatrix}$$

$$B = \begin{bmatrix} 3 & -1 \\ 4 & 2 \end{bmatrix}, \text{ find } 3B$$

$$3\begin{bmatrix} 3 & -1 \\ 4 & \lambda \end{bmatrix} = \begin{bmatrix} 9 & -3 \\ 1\lambda & 6 \end{bmatrix}$$

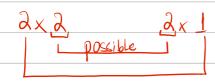
$$\begin{bmatrix} 3 \\ -\lambda \end{bmatrix} = \begin{bmatrix} 6 \\ -4 \end{bmatrix}$$

$$\begin{bmatrix} 6 \\ -4 \end{bmatrix} + \begin{bmatrix} 15 \\ -24 \end{bmatrix} - \begin{bmatrix} 0 \\ 21 \end{bmatrix}$$

$$\begin{bmatrix} 3 \\ -2 \end{bmatrix} - \begin{bmatrix} 10 \\ -16 \end{bmatrix}$$

4. Matrix multiplication: Two matrices can only be multiplied if the number of columns of the first matrix is equal to the number of vows of the second matrix.

Note: AB + BA



2x1: Order of the product

$$\begin{bmatrix} 3 & 5 & 1 \\ -2 & 1 & -3 \end{bmatrix} = R_1 \begin{bmatrix} 3 \times 1 \end{bmatrix} + (5 \times -3)$$

$$R_2 \begin{bmatrix} -3 \times 1 \end{bmatrix} + (1 \times -3)$$

$$= \begin{bmatrix} 3 - 15 \\ -\lambda - 3 \end{bmatrix}$$

$$2 \times 2 \qquad 2 \times 2 \qquad -6 \qquad -1$$

$$2 \times 2 \qquad 15 \qquad 11$$

Calculate 
$$\begin{pmatrix} 3 & 7 \\ -1 & 4 \end{pmatrix} \begin{pmatrix} -2 & 1 \\ 4 & 2 \end{pmatrix}$$
.  $\begin{bmatrix} 22 & 1 \\ 48 & 7 \end{bmatrix}$ 

5. Identity Matrix 
$$T_{=}\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$
 One of matrices

$$5x = 5$$
  
 $0x = 0$   
 $-3x = -3$ 

SXI= 5 Note: Any matrix multiplied by the identity (0 XI= 10) matrix will remain uncharged

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

Sinc = 0.5 K = Sin (03)

AT = A  $I = A^{-1}A$  Any motrix multiplied by its inverse will give the identity motrix.

6. Inverse of a matrix (2x2)

$$A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$$

$$A = \begin{bmatrix} a & b \\ c & d \end{bmatrix} \qquad A = \begin{bmatrix} 1 & d & -b \\ ad-bc & -c & a \end{bmatrix}$$

Examples

Calculate the inverse of 
$$\begin{pmatrix} 5 & 3 \\ 6 & 4 \end{pmatrix}$$

Note: 
$$AX = B$$
  
 $X = A'B'$   
 $X = BA'$