Section 8.3 ➔ Intro to Matrices & Operations w/Matrices

- Special "Reads" from your textbook. "Add" these to 'YOUR' 8.3 notes➔
  - Read sec(8.2) & ***copy/paste*** the 3-D "**visual Plane**" figures of the different types of Solutions for a 3X3 system. **[[5-diagrams→ 1 sol/Infinite sol/3-ex of no sol.]]**
  - Read in Sec(8.3) about → 1) Properties of Matrices **[p.909]**
    2) Multiply Matrices **[p.910-911]**
    3) Who is A. Caley? **[p.909]**

❖ **A Matrix→** A rectangular array of number(s) ***[elements/entries]*** in rows ***by*** columns placed in **[**Brackets**]**… [**a**]… ***a is the entry in 1st -row – 1st-col.***

- Use a Capital letter to 'name' or denoted a matrix
- 'Order'/dimension of a matrix is denoted **m x n** where **m**= # of rows by **n**= # of columns.
- An element/entry of a matrix is denoted by →
  - A= [a_{ij}] where ***a*** is the element of matrix A in The i^{th} row – j^{th} column.

❖ **Square Matrix →** a Matrix with the same number of rows an columns. i.e. 2X2, 3X3, etc…

EX-1) Given: A = $\begin{bmatrix} 5 & -2 \\ -3 & \Pi \\ 1 & 6 \end{bmatrix}$ **a)** What is the order of A? **b)** Identify a_{12} and a_{31}

❖ **Equal Matrices→** **A = B** if and only if 1) the matrices have the same order rowXcol—mxn
2) $a_{ij} = b_{ij}$ → same position = same element.

❖ **Column Matrix →** Matrix with ***1 column*** ***[may have 1 or multiple rows]*** && Row matrix→ Matrix with ***1 row*** ***[may have 1 or multiple columns]***

❖ **Scalor Multiplication →** A **scalor** ***'c'*** in advanced math or Matrices is a ℝ number used to augment an expression or a Matrix. We just multiply each entry of the matrix by the *'scalor'*.

ADDITION⊕ & SUBTRACTION⊖ of Matrices➔ have 2-basic "Rules"

1) Matrices to be +/- must have the **same "order"**

2) **+/-** each element in corresponding position & place result back is same position.

EX-2) Given Matrix A & B, perform the Matrix Operation(s)

A = $\begin{bmatrix} -4 & 1 \\ 3 & 0 \end{bmatrix}$ B = $\begin{bmatrix} -1 & -2 \\ 8 & 5 \end{bmatrix}$ Find 3A + 2B

Matrix Multiplication→ Multiply→ ROW X COL. **[add the product of entries]**

RULES→ The "order" of the 2-matrices doesn't matter as long as….

A) IF the **Col of the 1st Matrix = the Rows of the 2nd Matrix**, then….
B) The "order" of the product is → Row of 1st X Col of 2nd → [RxC]
C) ***Bonus***: 2 square matrices may always be multiplied.

MULTIPLICATION OF MATRICES IS NOT COMMUTATIVE!! AB ≠ BA

IF AB = *I* and BA = *I*, where *I* = $\begin{bmatrix} \mathbf{1} & \mathbf{0} \\ \mathbf{0} & \mathbf{1} \end{bmatrix}$ **[identity matrix], then the matrices are inverses.**

EX-3) Find the product **AB,** if possible. A = $\begin{bmatrix} 2 & 3 \\ 4 & 2 \\ 0 & 1 \end{bmatrix}$ B = $\begin{bmatrix} 0 & 3 \\ -7 & 5 \end{bmatrix}$

AB = $\begin{bmatrix} 2 & 3 \\ 4 & 2 \\ 0 & 1 \end{bmatrix} \cdot \begin{bmatrix} 0 & 3 \\ -7 & 5 \end{bmatrix} = \begin{bmatrix} \quad & \quad \\ & \\ & \end{bmatrix}$

3 X **2 ⟺ 2** X 2

3 X 2