



## Series 03: (Matrices)

**First exercise:**

If we have three matrices : A ,B ,C

$$D = \begin{bmatrix} 2 & 2 \\ 3 & -1 \end{bmatrix} \quad C = \begin{bmatrix} 4 & -6 \\ 2 & 1 \end{bmatrix} \quad B = \begin{bmatrix} 2 & 1 \\ 4 & 3 \end{bmatrix} \quad A = \begin{bmatrix} 1 & 0 & 2 \\ 0 & -1 & 1 \\ 1 & -2 & 0 \end{bmatrix}$$

1- Calculate the effect of each of the matrices  $\text{tr}(B)$  , $\text{tr}(A)$  .

2- Calculate :  $A^t$  ,  $B+C$  ,  $A.C$  ,  $B.C$ .

3- Calculate :  $D^2$

4- Calculate :  $D^2-D$  , What do you conclude?

**Second exercise:**

if it was:

$$A = \begin{pmatrix} 1 & 0 & 2 \\ 3 & 1 & 4 \\ 2 & 1 & 0 \end{pmatrix}, B = \begin{pmatrix} 1 & 1 & 1 \\ 4 & 2 & 2 \end{pmatrix}, C = \begin{pmatrix} -1 & 3 \\ 2 & 0 \\ 2 & 4 \end{pmatrix}$$

Find if possible:

$$A^t, B^t, C^t, \quad A-B, \quad B^t + 2C \quad , AB \\ , BC,$$

**Third exercise:**

Let us have:

$$M = \begin{pmatrix} 4 & 1 \\ 3 & 2 \end{pmatrix}, J = \begin{pmatrix} 1 & 0 \\ 1 & 0 \end{pmatrix}, K = \begin{pmatrix} 0 & 1 \\ 0 & -3 \end{pmatrix}$$

Show that:

$$M.J = 5.J$$

Calculate  $M^2$ .

Show that:  $M^2.K = K$

**Fourth exercise:**

Calculate the following determinants:

$$\begin{vmatrix} 1 & 2 \\ 3 & 4 \end{vmatrix}, \begin{vmatrix} 2 & 1 & 0 \\ -1 & 1 & 2 \\ 4 & 2 & 1 \end{vmatrix}, \begin{vmatrix} 1 & 2 & 3 \\ 0 & 3 & 5 \\ 0 & 0 & 4 \end{vmatrix}, \begin{vmatrix} 7 & 2 & 1 \\ 6 & 3 & 1 \\ 5 & 4 & 1 \end{vmatrix}, \begin{vmatrix} 0 & 1 & 5 \\ 0 & 2 & 4 \\ 0 & 3 & 6 \end{vmatrix}$$

$$\begin{vmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 0 & 0 & 0 \end{vmatrix}, \begin{vmatrix} 1 & a & 2 \\ 1 & b & 2 \\ 1 & c & 2 \end{vmatrix}$$

**Fifth exercise:**

Let us have:

$$A = \begin{pmatrix} 2 & 5 \\ 1 & 6 \end{pmatrix} \quad B = \begin{pmatrix} 1 & 1 & -1 \\ 2 & 1 & 0 \\ 1 & -1 & 1 \end{pmatrix}$$

Calculate the reciprocal of each matrix A , B

**Sixth exercise:**

$$B = \begin{pmatrix} 2 & -1 \\ 4 & 1 \end{pmatrix}, \quad C = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$$

1- Calculate the reciprocal of the matrix B.

2- Find the matrix X, such that: X.B=C

3- Find the matrix X, such that: B.X=C