BADJI MOKHTAR UNIVERSITY
FACULTY OF ECONOMICS AND MANAGEMENT SCIENCES
Department: Financial Sciences

Exercises Serie N01.
Data Analysis, Statistics, and Applications

Level: L3
Instructor: Dr. Soumaya Allaoui

Exercise1:

Let $A = \begin{pmatrix} 2 & -1 \\ 3 & 4 \end{pmatrix}$ and $B = \begin{pmatrix} 5 & 0 \\ -2 & 1 \end{pmatrix}$.

1-Calculate $A + B$ and $A - B$ and B^T

2-Find the product AB and BA. Are they equal?

1-3-Calculate Calculate $A^2 - 4A$.

4-Can we find the Determinant of A ? deduce if A is invertible.

Exercise2:

$$\begin{cases} 2x - 3y = 5 \\ -3x + 5y = -2 \end{cases}$$

1. Write the system in matrix form as A.
2. Find A^{-1} and solve the system.

Exercise3:

Let $A = \begin{bmatrix} 3 & 1 & 1 \\ 0 & 0 & 2 \\ 1 & 2 & 2 \end{bmatrix}$

1. Calcul the inverse if is possible.
2. Calculate Det(A^t), Det(3A).
3. Let λ a constant. calculate $D = A - \lambda \mathbf{I}$. Deduce determinant of D.
4. Clacul D for λ=2 then resolve the equation $D = 0$.

Exercise 4:

Consider the following matrix:

$$A = \begin{pmatrix} 4 & 1 & 2 \\ 0 & 3 & 1 \\ 0 & 0 & 2 \end{pmatrix}$$

1. Find the eigenvalues of matrix A by solving the characteristic equation $\det(A - \lambda I) = 0$.
2. Find the eigenvectors corresponding to each eigenvalue λ by solving $(A - \lambda I)x = 0$.
3. Form the matrix P (using the eigenvectors as columns) and the diagonal matrix D (using the eigenvalues on the diagonal.)
4. Verify the diagonalization of A by calculating $A = PDP^{-1}$.