I TD

1. Quiz:

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

Question 1

Calculate $A + B$ and $A - B$.

Question 2

Find the product AB and BA. Are they equal?

Let $A = \begin{pmatrix} 7 & 0 & -1 \\ 4 & -2 & -2 \end{pmatrix}$ and $B = \begin{pmatrix} -9 & 1 & 3 \\ 0 & -6 & -5 \end{pmatrix}$.

Question 3

Calculate 3A - 4B.

Question 4

Compute the products AB and BA (if possible).

Question 5

Can we find the Determinant of A and B?

Question 6

Calculate B^T and AB^T:

Question 7

Find the Determinant of AB^T?

2. Quiz:

Let $A = \begin{pmatrix} -2 & -3 \\ 5 & 7 \end{pmatrix}$.

Question 1

Calculate $A^2 - 4A$.

Question 2

Show that $A^2 - 4A = A \times (A - 4I_2)$ and deduce that A is invertible. What is its inverse matrix?

3. Quiz:

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

Question

Calculate the inverse of A

Hint:

- *Calculate the determinant of A.*

1. *Show the steps to calculate the determinant using the formula:*
   $\det(A) = a(ei - fh) - b(di - fg) + c(dh - eg)$,
   where $A = \begin{pmatrix} a & b & c \\ d & e & f \\ g & h & i \end{pmatrix}$.

- *Find the adjugate of A.*

1. *using the formula:*
   $A^{-1} = \dfrac{1}{\det(A)} \cdot \operatorname{adj}(A)$.

- *Verify your result by checking that* $(A \cdot A^{-1} = I)$*, where* I *is the identity matrix.*

4. Quiz:

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

Question 1

Write the system in matrix form as A.

Question 2

Find A^{-1} and solve the system.

5. Quiz:

Consider the following matrix:

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

Question

Find the eigenvalues of matrix A by solving the characteristic equation $\det(A - \lambda I) = 0$.

Find the eigenvectors corresponding to each eigenvalue λ by solving $(A - \lambda I)x = 0$.

Form the matrix P, using the eigenvectors as columns.

Form the diagonal matrix D, using the eigenvalues on the diagonal.

Verify the diagonalization of A by calculating $A = PDP^{-1}$.