

SHOW ALL POSSIBLE SOLUTIONS.

- I. Compute the following, if possible. If the operations cannot be performed, explain why. (14 marks)

1. $(2A)^3$ if $A^3 = \begin{bmatrix} 1 & 1 \\ -5 & -2 \end{bmatrix}$

2. Given $A = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$, find

a. A^8

b. $A^2 - A$

3. Given $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 1 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 2 & -1 \\ 3 & 4 \\ 1 & -2 \end{bmatrix}$, compute

a) $(AB)^T$

b) $3A - 2B$

c) $-A^T$

d) $(A^T)^T$

- II. Let $A = \begin{bmatrix} 1 & -2 \\ -3 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 0 & 1 \\ 5 & -2 \end{bmatrix}$, and $C = \begin{bmatrix} 8 & -2 \\ -6 & 4 \end{bmatrix}$. Find the matrix X that satisfies the equation $2X + B = -3A + C$. (5 marks)

- III. Find the inverse of the given matrix $A = \begin{bmatrix} 1 & 4 & 0 \\ 2 & 1 & 0 \\ 3 & 4 & 1 \end{bmatrix}$. (10 marks)

- IV. For which value(s) of the constant k does the system have no solutions? Exactly one solution? Infinitely many solutions? Explain your reasoning. (6 marks)

$$\begin{aligned} x - y &= 3 \\ 2x - 2y &= k \end{aligned}$$

- V. Solve the system by Gauss/Gauss – Jordan reduction (10 marks)

$$\begin{aligned} x + 2y + 3z &= 9 \\ 2x - y + z &= 8 \\ 3x - z &= 3 \end{aligned}$$