



Student's Name	Student's ID	Group No.	Lecturer's Name

Question No.	I	II	III	IV	Total
Mark					

[I] Determine whether the following is **True** or **False**. Justify your answer.

(1) The following system has infinitely many solutions ()

$$\begin{aligned}x - 3y - 2z &= 0 \\ -x + 2y + z &= 0 \\ 2x + 4y + 6z &= 0\end{aligned}$$

(2) For $A = [a_{ij}]_{n \times n}$, if $A^2 = 0_{n \times n}$ then $A = 0_{n \times n}$ ()

(3) There is a lower triangular matrix A for which $A^2 = \begin{bmatrix} 4 & 0 \\ 9 & 1 \end{bmatrix}$ ()

(4) The matrix $\begin{bmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ -1 & 0 & 1 \end{bmatrix}$ is elementary ()

[II] Choose the correct answer.

(1) $\begin{vmatrix} 5 & 2 & 2 \\ -1 & 1 & 2 \\ 3 & 0 & 0 \end{vmatrix}$ equals

(a) -18

(b) 6

(c) -6

(d) None

(2) If $A = \begin{bmatrix} t & 0 \\ 0 & t \end{bmatrix}$ where t is a nonzero constant, then

(a) A commutes with every 2×2 matrix (b) The system $A\mathbf{x} = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$ is inconsistent (c) $\text{tr}(A) = t^2$ (d) None

(3) The values of k for which the matrix $A = \begin{bmatrix} k & -k & 3 \\ 0 & k+1 & 1 \\ k & -8 & k-1 \end{bmatrix}$ is singular are

(a) $k = 0, 1$

(b) $k = 1, 2$

(c) $k = 0, 2$

(d) None

(4) (a) (b) (c) (d) None

OVER

[III] Solve the following matrix equations for X where $A = \begin{bmatrix} -1 \\ 2 \end{bmatrix}$, $B = [4 \ 2]$, $C = \begin{bmatrix} 3 & 0 \\ 1 & -2 \end{bmatrix}$ and $D = \begin{bmatrix} 2 & 0 & 0 \\ 1 & 2 & 0 \\ 0 & 1 & 2 \end{bmatrix}$

(a) $X - (2AB + C^T)^{-1} = 0_{2 \times 2}$

(b) $DX = \begin{bmatrix} 1 & 0 & -1 \\ 2 & 3 & 0 \end{bmatrix}$

OVER

[IV]

(1) _____

(2)