

First Mid Term Exam., Summer, 1434
M 107 Full Marks: 25 Time: **90 Min.**

Question 1. Solve the following system of linear equations by Gauss-Jordan elimination:

$$\begin{cases} -x_1 - x_2 + 2x_3 - 3x_4 + x_5 = 0 \\ 2x_1 + 2x_2 - x_3 + x_5 = 0 \\ x_1 + x_2 - 2x_3 - x_5 = 0 \\ x_3 + x_4 + x_5 = 0. \end{cases}$$

Question 2. Consider the following system of linear equations:

$$\begin{cases} x + 2y + 3z = 1 \\ 2x + 5y + 3z = 2 \\ x + 8z = 0. \end{cases}$$

(a) Write the system in the form of $AX = B$, and then find A^{-1} by elementary row operation.

(b) Solve the system by using A^{-1} .

Question 3. Find the determinants of the following matrices:

$$A = \begin{pmatrix} 1 & 0 & 1 \\ 1 & 2 & 3 \\ 1 & 1 & 1 \end{pmatrix}, B = \begin{pmatrix} 1 & 0 & 0 & 0 \\ -2 & 1 & 0 & 0 \\ 3 & -7 & 1 & 0 \\ -4 & 5 & -6 & 1 \end{pmatrix}, C = 2B, D = B^2.$$

Question 4. For which value(s) of λ the following matrix fails to be invertible?

$$A = \begin{pmatrix} 1 & 2 & 4 \\ -5 & 1 & 6 \\ \lambda & -5 & 2 \end{pmatrix}.$$

Question 5. Solve the system of linear equations by using Cramer's Rule:

$$\begin{cases} 2x + y + z = 4 \\ x - y + z = 1 \\ x + y - z = 1 \end{cases}$$