

TIME: 90 min  
M - 107

KING SAUD UNIVERSITY  
DEPARTMENT OF MATHEMATICS  
(SEMESTER I, 1436 -1437) FIRST MID-TERM

FULL MARKS: 50

Question:1 . Let

$$x - y - z = 0$$

$$2x + y + z = 3$$

$$x + 2y + z = 0$$

- (a) Write the above system of linear equations in the form  $AX=B$ , [12]  
(b) Find  $A^{-1}$ , if exists, by using elementary matrix method, and  
(c) Use  $A^{-1}$  to solve the above system of equations.

Question: 2 . (a) Evaluate  $\det(A)$  by using row reduction, where

$$A = \begin{bmatrix} 1 & 0 & 0 & 1 \\ 2 & 0 & -1 & 3 \\ 0 & 2 & 1 & 4 \\ -2 & -1 & 0 & 1 \end{bmatrix} \quad [7]$$

(b) Find all values of  $x$  for which matrix

$$A = \begin{bmatrix} 1 & -1 \\ 1 & x^2 - 2 \end{bmatrix} \text{ is invertible.} \quad [7]$$

Question: 3 . Solve the linear system by using Crammer's Rule

$$3x_1 + 5x_2 = 7$$

$$6x_1 + 2x_2 + 4x_3 = 10$$

$$-x_1 + 4x_2 - 3x_3 = 0$$

[12]

Question: 4 . Suppose the points  $(1,1)$ ,  $(2,3)$  and  $(3,4)$  lie on the curve

$$y = ax^2 + bx + c.$$

- i. Find the system of linear equations in  $a$ ,  $b$  and  $c$ .  
ii. Solve the system by Gauss – Jordan method to find  $a$ ,  $b$  and  $c$ .  
iii. Write the equation of the curve. [12]