

MATHEMATICS ASSIGNMENT - 03

MATRICES AND GAUSSIAN ELIMINATION

Set - A

August 23, 2018

Question 01

Determine the inverse of the following matrix using row transformations. Given that it is invertible.

$$C = \begin{bmatrix} 3 & 1 & 0 \\ -1 & 2 & 2 \\ 5 & 0 & -1 \end{bmatrix} \quad (1)$$

Question 02

Solve the following system of linear equations using Gauss Jordan Elimination

$$\begin{aligned} x_1 + 3x_2 + 4x_3 &= 3 \\ 2x_1 + 7x_2 + 3x_3 &= -7 \\ 2x_1 + 8x_2 + 6x_3 &= -4 \end{aligned} \quad (2)$$

Question 03

Repeat Question 02 using Gauss Elimination.

Question 04

Use LU decomposition to solve following simultaneous linear equations

$$\begin{bmatrix} 10 & 3 & 4 \\ 2 & -10 & 3 \\ 3 & 2 & -10 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 15 \\ 37 \\ -10 \end{bmatrix} \quad (3)$$

Question 05

What three elimination matrices E_{21} , E_{31} and E_{32} put A into upper triangular form $E_{32}E_{31}E_{21}A = U$.

Using these, compute the matrix L (and U) to factor $A = LU$.

$$A = \begin{bmatrix} 1 & 1 & 1 \\ 2 & 4 & 5 \\ 0 & 4 & 0 \end{bmatrix} \quad (4)$$

Question 06

Show (using row transformations) that the following matrix does not have an inverse.

$$B = \begin{bmatrix} 3 & 3 & 6 \\ 0 & 1 & 2 \\ -2 & 0 & 0 \end{bmatrix} \quad (5)$$