

MA1140 ELEMENTARY LINEAR ALGEBRA
MARCH 28 TO MAY 02, 2022 (1-2 SEGMENT)
ASSIGNMENT 1 (DUE DATE: 08.04.2022, 11:59 PM)

Rules:

- Answer all questions.
- The deadline is strict and even a one minute late submission cannot be accepted. Late submissions receive 0 marks.
- Only three grades are possible for each question: 0 for a wrong answer, 1.5 for a partially correct answer or 3 for a fully correct answer.

Questions:

1. Express the following system of linear equations in matrix form:

$$3u + 4v - w + 2x = 6$$

$$u - 2v + 3w + x = 2$$

$$10v - 10w - x = 1$$

2. Using Gaussian elimination compute the row echelon form of the matrix

$$\begin{pmatrix} 1 & 1 & 1 \\ -4 & -3 & -2 \\ 3 & 2 & 1 \end{pmatrix}$$

3. Compute the inverse of the matrix

$$\begin{pmatrix} 1 & 2 & -1 \\ 2 & 5 & -1 \\ -1 & -4 & 0 \end{pmatrix}$$

using Gaussian elimination.

4. Find all values of x for which the matrix

$$\begin{pmatrix} 1 & 2 & 1 \\ 3 & 0 & 1 \\ 1 & 1 & x \end{pmatrix}$$

is invertible.

5. Find the LU decomposition of the matrix

$$\begin{pmatrix} 7 & -2 & 1 \\ 14 & -7 & -3 \\ -7 & 11 & 18 \end{pmatrix}$$

6. Find the solution set of the system of equations

$$2u - 3v + w + 7x = 14$$

$$2u + 8v - 4w + 5x = -1$$

$$u + 3v - 3w = 4$$

$$-5u + 2v + 3w + 4x = -19$$

by computing the reduced row echelon form of the appropriate corresponding matrix.