Information Technology University, Lahore, Pakistan
Linear Algebra (MT-121)
Assignment # 2
Spring 2024
BSCE2023

February 24, 2024

Submission Deadline: Friday, March 1, 2024 Maximum Marks: 100

- Late submissions will not be graded.
- This Assignment will be conducted under the rules and guidelines of the ITU Honour Code, and no cheating will be tolerated (i.e., no discussion about the Assignment with other students, no plagiarism at all). Each student must be able to justify his/her work.

Question 1

Find the points with $z = 0$ and $z = 2$ on the intersection line of the planes $x + y + 3z = 6$ and $x - y + z = 4$. [10]

Question 2

Find the matrix $\mathbf{A}$ that multiplies (x, y, z) to give (y, z, x). Also find the matrix $\mathbf{B}$ that brings it back. [10]

Question 3

Apply elimination and back substitution to solve the set of linear equations: [10]

$$\begin{aligned} 2x - 3y + 1 &= 2 \\ 4x - 5y + z &= 5 \\ 2x - y - 3z &= 5 \end{aligned}$$

Question 4

Identify three different numbers a for which elimination fails to give three pivots? [10]

$$A = \begin{bmatrix} a & 2 & 3 \\ a & a & 4 \\ a & a & a \end{bmatrix}$$

Question 5

Which three matrices E_{21}, E_{31}, E_{32} put **A** into triangular form U and $(E_{32}E_{31}E_{21})$A = U? [10]

$$A = \begin{bmatrix} 1 & 1 & 0 \\ 4 & 6 & 1 \\ 2 & 3 & 0 \end{bmatrix}$$

Question 6

Inverse matrices **A** and **B** using the Gauss-Jordan method. [10 + 10 = 20]

$$A = \begin{bmatrix} 1 & 0 & 0 \\ 2 & 3 & 1 \\ 0 & 0 & 1 \end{bmatrix} \qquad B = \begin{bmatrix} 3 & 5 & -9 \\ 4 & 2 & 6 \\ 8 & 9 & 7 \end{bmatrix}$$

Question 7

Given the matrix [20]

$$A = \begin{bmatrix} 4 & 6 & 7 \\ 6 & 3 & 1 \\ 2 & 9 & 5 \end{bmatrix}$$

1. What are **L** and **D** for the matrix **A**?
2. What is **U** in **A = LU**?
3. What will be the new **U** in **A = LDU**?

Question 8

Which permutation makes PA upper triangular and P_1AP_2 lower triangular? [10]

$$A = \begin{bmatrix} 0 & 0 & 6 \\ 1 & 2 & 3 \\ 0 & 4 & 5 \end{bmatrix}$$