

CSE 330 Summer 2024
Assignment 5
Total Marks: 25

1. A linear system is described by the following equations:

$$-3x + 7y + 2z = 15$$

$$4x + 3y + \frac{3}{2}z = 11$$

$$x - 9y - 3z = -25$$

Based on these equations, answer the questions below.

(a) [1 mark] From the given linear equations, identify the matrices **A**, **x** and **b** such that the linear system can be expressed as a matrix equation.

(b) [5 marks] Construct the Frobenius matrices **F⁽¹⁾** and **F⁽²⁾** from this system.

(c) [5 + 2 = 7 marks] Compute the **upper triangular matrix U** and the **lower triangular matrix L** and prove that **LU = A**.

(d) [5 marks] Now find the solution of the linear system using the LU decomposition method.

2. A function is given by **f(x) = e^{-3x} + cosx - x⁴** which is to be integrated on the interval [1, 3].

a. (2 marks) Evaluate the **exact integral I(f)**.

b. (3 marks) Compute the numerical integral by using the **Trapezoid Rule**

c. (2 marks) Find the **relative percentage error**