Mathematical Modelling for Data Science (CSE3045)

First Lab Assessment

Date – 8/8/2023

Read the instructions carefully before attempting the questions.

- Use of any AI tool or copied from internet will leads to zero marks
- Solve the question in separate files and you have to create .py files
- After solving the questions prepare a PDF file containing the question followed by your code. Your code should be properly commented.
- Test your code with three different inputs and the PDF file must contain the screenshots of the output and input from console.
- You are not allowed to use linalg library of numpy.
- Upload the PDF file in in VTOP (Compulsory)
- Upload your .py files on the following link https://drive.google.com/drive/folders/1sMWEc71Kw51hqWyt7fTrnuLxD_O7psPs?usp=sharing and rename them as registrations_number_1.py
- The above link and VTOP will be active till 11:59 PM 08.08.2023. Thereafter you can't submit the solution and no marks will be awarded.

Solve the following problems

1. Consider the linear equations and solve them to find the values for co-efficient using matrix method. The equations are $3s - 5t = 7$ and $-2s + 4t = -6$. Your code must satisfy the following:

a) Code must able to take input equations and code must be smart enough to parse it and form the required matrix and vectors.

b) You have to build your logic through user defined functions to get the inverse and adjoint of the matrix.

c) Show the outputs of all the intermediate steps and code must be properly commented.

2. You are given a set of vectors represented as 3-dimensional points in space. Your task is to determine whether these vectors are coplanar or not. Write a function or a program that takes as input a list of vectors, where each vector is represented as a triplet (x, y, z), and returns a Boolean value indicating whether the vectors are coplanar or not. Test your code with following triplets:

$\vec{a} = [2 \quad 3 \quad 4]$ $\vec{b} = [5 \quad 6 \quad 7]$ $\vec{c} = [-1 \quad -1 \quad -1]$