Assignment 1
DSECL ZC416 - Mathematical Foundations for Data Science

Instructions

1. Use any programming language (other than Excel) of your choice. Attach only the relevant data in your submission and no need to submit the code.

2. By random entries, I mean a system generated random number. No marks would be awarded for deterministic entries.

3. This is not a group activity. Each student should do the problems and submit individually.

4. Assignments have to be handwritten and uploaded as a single pdf file with name BITSID.pdf

5. Submissions beyond 11th of June, 2021 17.00 hrs would not be graded

6. Assignments sent via email would not be accepted

7. Copying is strictly prohibited. Adoption of unfair means would lead to disciplinary action.

<u>Answer all the questions</u>

Q1) Write a code to perform Gauss elimination with and without pivoting for a 2 x 2 system, taking the number of significant digits (d) to be considered as user input. Using the code, solve the 2 x 2 system with random coefficients for $d = 3, 4, 5$ and 6. Display the results in a tabular form. (5)

Q2) Write a code to perform (5)

   a) Gauss Jacobi method

   b) Gauss Seidel method

for a 3 x 3 system by checking the convergence criteria using a suitable norm. Test the method on a random 3 x 3 system, which is diagonally dominant and check your results. A comparison between the two methods should be presented in tabular form. The stopping criteria could be taken as the lowest iteration number when the relative percentage error is less than 1%.

Generate a random matrix of size 3 x 3 which cannot be made diagonally dominant and check if the iterates converge. The random entries generated should be of the form n.dddd