

PHY 422

Computational methods in Physics -I

Lab 5

Pdf file should be inside the .zip folder

1) Write a simple code for multiplication of matrix A and B

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

2) Use partial pivoting to solve using elimination

$$2x_2 + x_3 = 5; \quad 4x_1 + x_2 - x_3 = -3; \quad -2x_1 + 3x_2 - 3x_3 = 5$$

3) Use Gauss Jordan to solve

$$2x_1 + 4x_2 + x_3 = 3; \quad 3x_1 + 2x_2 - 2x_3 = -2; \quad 3x_1 - 3x_2 + 3x_3 = 18$$

4) Solve using Dolittle and Crout-decomposition

$$2x_1 + x_2 + 4x_3 = 12; \quad 8x_1 - 3x_2 + 2x_3 = 20; \quad 4x_1 + 11x_2 - x_3 = 33$$

Also gets the inverse.

5) Try to make the above codes generalize for any matrix

$$u_{ii} = 1$$

$$l_{ii} = a_{ii} - \sum_{k=1}^{i-1} l_{ik} u_{ki}$$

$$l_{ij} = a_{ij} - \sum_{k=1}^{j-1} l_{ik} u_{kj}, i > j$$

$$u_{ij} = \frac{\left(a_{ij} - \sum_{k=1}^{i-1} l_{ik} u_{kj}\right)}{l_{ii}}, i > j$$

$$l_{ii} = 1$$

$$u_{ii} = a_{ii} - \sum_{k=1}^{i-1} l_{ik} u_{ki}$$

$$u_{ij} = a_{ij} - \sum_{k=1}^{i-1} l_{ik} u_{kj}, i > j$$

$$l_{ij} = \frac{\left(a_{ij} - \sum_{k=1}^{j-1} l_{ik} u_{kj}\right)}{u_{jj}}, i > j$$

Lab Report Submission

PDF file with the flow chart, code and output

MS31199_3.pdf

If my Roll No. is MS31199 and submitting Lab Report No. 3 then

Prepare folder MS31199_3 containing files as:

MS31199_3.pdf
MS31199_3_code1.C
MS31199_3_code2.C
MS31199_3_code3.C and so on.
MS31199_3_output3.out
MS31199_3_input2.in

Assume that MS31199_3_output3.out is output of code3
And MS31199_3_input2.in is input for code2

Zip the folder as MS3119_3.zip and upload to moodle

Should contain

- 0)** Problem
- 1)** Algorithm
- 2)** The code, just add the image of code
- 3)** Instructions on system done
- 4)** Output, just image of output
- 5)** Summary

If you are given the Lab exercise today (Thursday), then deadline is **next week Thursday afternoon (13:01)**

Thursday, Friday, Saturday, Sunday, Monday, Tuesday, Wednesday