

Program na05: Tridiagonal Systems

Overview: Solve tridiagonal systems of equations.

Introduction: Copy the module **LUdecomp3** to solve a tridiagonal system of equations. It should contain subroutines **LUdecomp3** and **LUSolve3**. Do problems 4 and 9 on pages 77 and 78. Write a separate subroutine for each problem, but call all three subroutines from the main program. In addition, write a function **triMultiply(c,d,e,x)** to multiply Ax , where A is the tridiagonal coefficient matrix represented by the vectors c , d , e . Use **triMultiply** to check your work.

Input: Do all input from a file **na05in.txt**. Systems that are read in should consist of three diagonals in the order superdiagonal, main diagonal, subdiagonal, constant vector, i.e. e, d, c, b .

Output: Output to the standard output. The output for each problem should be:

<Title. E.g. Problem 4, page 77>

e = <print the superdiagonal>

d = <print the main diagonal>

c = <print the subdiagonal>

b = <print the constant vector>T

x = <solution vector>T

Check: $\max(\text{abs}(Ax-b))$ = <print the value>

Extra for experts: Instead of writing vectors c , d , and e , write a subroutine to output the augmented matrix $[A|b]$ using only the vectors c , d , and e . That is, do not actually construct A , but just print the zeros. Make it look nice.

Checklist:

Folder: **na05<lastname>**

Module files: **matIO.py**, **LUdecomp3.py**

Main program file: **na05.py**

Input file: **na05in.txt**