



Numerical Methods Lab Question

22 February 2018

Instructions

- Your code should be able to communicate the appropriate message, in the case of a computational problem.

Questions 1

(a) Using your code in exercise 1 of Lab 1, solve the linear system $Ax = b$, where

$$A = \begin{pmatrix} 2 & 1 & -1 & 2 \\ 4 & 5 & -3 & 6 \\ -2 & 5 & -2 & 6 \\ 4 & 11 & -4 & 8 \end{pmatrix}, \quad \text{and} \quad b = \begin{pmatrix} 5 \\ 9 \\ 4 \\ 2 \end{pmatrix}$$

(b) Modify your code in Exercise 1 of Lab 1 to perform Gaussian elimination and return a matrix in the form

$$A = \begin{pmatrix} 0 & 0 & a_{13} \\ 0 & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{pmatrix}$$

Hence solve the linear system $Ax = b$, where

$$A = \begin{pmatrix} 3 & 1 & -1 \\ 1 & -4 & 2 \\ -2 & -1 & 5 \end{pmatrix}, \quad \text{and} \quad b = \begin{pmatrix} 3 \\ -1 \\ 2 \end{pmatrix}$$

(c) Using your code in exercise 2 of Lab 1, solve the equation $AX = B$, where

$$A = \begin{pmatrix} 1 & -1 & 2 & -1 \\ 2 & -2 & 3 & -3 \\ 1 & 1 & 1 & 0 \\ 1 & -1 & 4 & 3 \end{pmatrix}, \quad \text{and} \quad B = \begin{pmatrix} -8 & -10 & -100 \\ -20 & -20 & -250 \\ -2 & -2 & -25 \\ 4 & 8 & 80 \end{pmatrix}$$

(d) Using your code in exercise 3 of Lab 1, solve Question (c).