

Numerical Analysis Semester 081 Problem Set 5

Reference: Chapter 04.07 LU Factorization

For these problems show all work by hand

1. Solve the system $AX = Y$ using the method of LU Factorization (i.e. solve $LY = B$ for Y and then $UX = Y$ for X) given the following matrix A and its decomposition $A = L*U$:

$$\begin{pmatrix} 1 & 1 & 6 \\ -1 & 2 & 9 \\ 1 & -2 & 3 \end{pmatrix} = \begin{pmatrix} 1 & 0 & 0 \\ -1 & 1 & 0 \\ 1 & -1 & 1 \end{pmatrix} \begin{pmatrix} 1 & 1 & 6 \\ 0 & 3 & 15 \\ 0 & 0 & 12 \end{pmatrix} \text{ using}$$

a) $B = \begin{pmatrix} 7 \\ 2 \\ 10 \end{pmatrix}$ b) $B = \begin{pmatrix} 23 \\ 35 \\ 7 \end{pmatrix}$

2. Find the triangular factorization $A = LU$ for the matrices

a) $A = \begin{pmatrix} 6 & 9 \\ 4 & 5 \end{pmatrix}$

b) $A = \begin{pmatrix} 3 & -7 & 2 \\ -3 & 5 & 1 \\ 6 & -4 & 0 \end{pmatrix}$

3. Use the LU factorization in problem 1 to compute the inverse of the matrix A in that problem. (Follow Example 3 of Section 4.07)