KUTAISI INTERNATIONAL UNIVERSITY

Homework 7
Numerical Linear Algebra
Dimitri Tabatadze
00:33 Friday 10th November, 2023

1. (a)

$$A = \begin{pmatrix} 2 & -1 & 1 \\ 3 & 3 & 9 \\ 3 & 3 & 5 \end{pmatrix}$$

$$\begin{pmatrix} 1 & 0 & 0 \\ -3/2 & 1 & 0 \\ -3/2 & 0 & 1 \end{pmatrix} A = \begin{pmatrix} 2 & -1 & -1 \\ 0 & 9/2 & 15/2 \\ 0 & 9/2 & 7/2 \end{pmatrix}$$

$$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & -1 & 1 \end{pmatrix} \begin{pmatrix} 1 & 0 & 0 \\ -3/2 & 1 & 0 \\ -3/2 & 0 & 1 \end{pmatrix} A = \begin{pmatrix} 2 & -1 & -1 \\ 0 & 9/2 & 15/2 \\ 0 & 0 & -4 \end{pmatrix}$$

$$\implies L = \begin{pmatrix} 1 & 0 & 0 \\ 3/2 & 1 & 0 \\ 3/2 & 1 & 1 \end{pmatrix}, \quad U = \begin{pmatrix} 2 & -1 & -1 \\ 0 & 9/2 & 15/2 \\ 0 & 0 & -4 \end{pmatrix}$$

(b)

$$A = \begin{pmatrix} 1 & -1 & 0 \\ 2 & 2 & 3 \\ -1 & 3 & 2 \end{pmatrix}$$

$$\begin{pmatrix} 1 & 0 & 0 \\ -2 & 1 & 0 \\ 1 & 0 & 1 \end{pmatrix} A = \begin{pmatrix} 1 & -1 & 0 \\ 0 & 4 & 3 \\ 0 & 2 & 2 \end{pmatrix}$$

$$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & -1/2 & 1 \end{pmatrix} \begin{pmatrix} 1 & 0 & 0 \\ -2 & 1 & 0 \\ 1 & 0 & 1 \end{pmatrix} A = \begin{pmatrix} 1 & -1 & 0 \\ 0 & 4 & 3 \\ 0 & 0 & 1/2 \end{pmatrix}$$

$$\implies L = \begin{pmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ -1 & 1/2 & 1 \end{pmatrix}, \quad U = \begin{pmatrix} 1 & -1 & 0 \\ 0 & 4 & 3 \\ 0 & 0 & 1/2 \end{pmatrix}$$