

Homework 5

1. Factor the following matrices into the LU decomposition:

$$(a) \begin{pmatrix} 2 & -1 & 1 \\ 3 & 3 & 9 \\ 3 & 3 & 5 \end{pmatrix}$$

$$(b) \begin{pmatrix} 1 & -1 & 0 \\ 2 & 2 & 3 \\ -1 & 3 & 2 \end{pmatrix}$$

2. Use Thomas algorithm to solve the following linear systems:

(a)

$$\begin{cases} 2x_1 + x_2 &= 3 \\ x_1 + 2x_2 + x_3 &= -2 \\ 2x_2 + 3x_3 &= 0 \end{cases}$$

$$(b) \begin{cases} 2x_1 - x_2 = 3 \\ x_1 + 2x_2 - x_3 = 4 \\ x_2 - 2x_3 + x_4 = 0 \\ x_3 + 2x_4 = 6 \end{cases}$$

Remark: You can find useful material in the folder ‘Central Exercise 7’ and on the lecture slides