e

5. Compute the LU factorization of $A = \begin{pmatrix} -2 & 1 & 0 \\ 6 & -1 & -1 \\ 4 & 2 & -1 \end{pmatrix}$ and use it to solve $Ax = b$, where

$b = \begin{pmatrix} 0 \\ 6 \\ 10 \end{pmatrix}$.

You can use any method you prefer to find the LU factorization.

$$\left(\begin{array}{ccc|c} 1 & 0 & 0 & \\ 3 & 1 & 0 & \\ 2 & 0 & 1 & \end{array}\right) \left(\begin{array}{ccc|c} -2 & 1 & 0 & 0 \\ 6 & -1 & -1 & 6 \\ 4 & 2 & -1 & 10 \end{array}\right)$$

$$\left(\begin{array}{ccc|c} 1 & 0 & 0 & \\ 0 & 1 & 0 & \\ 0 & -2 & 1 & \end{array}\right) \left(\begin{array}{ccc|c} -2 & 1 & 0 & 0 \\ 0 & 2 & -1 & 6 \\ 0 & 4 & -1 & 10 \end{array}\right)$$

$$\left(\begin{array}{ccc|c} -2 & 1 & 0 & 0 \\ 0 & 2 & -1 & 6 \\ 0 & 0 & 1 & -2 \end{array}\right)$$

$$L \quad U$$

$$\left(\begin{array}{ccc} 1 & 0 & 0 \\ -3 & 1 & 0 \\ -2 & 2 & 1 \end{array}\right) \left(\begin{array}{ccc} -2 & 1 & 0 \\ 0 & 2 & -1 \\ 0 & 0 & 1 \end{array}\right)$$

$x_0 = 1$

$x_1 = 2$

$x_2 = -2$

$2x_1 + (-x_2) = 6$

$2x_1 + 2 = 6$

$2x_1 = 4$

$x_1 = 2$

$-2x_0 + x_1 = 0$

$-2x_0 + 2 = 0$

$-2x_0 = -2$

$x_0 = 1$