

ECEN 615 Fall 2023 Assignment #3

Due 25 October 2023

Part 1

Code the LU factorization algorithm discussed in the class notes for full matrices, along with the forward/backward substitution. To test your algorithm use it to factor and solve the below matrix. You do not need to code pivoting.

$$\mathbf{A} = \begin{bmatrix} 5 & 1 & 0 & -4 \\ 1 & 4 & 0 & -3 \\ 0 & 0 & 3 & -2 \\ -4 & -3 & -2 & 10 \end{bmatrix} \quad \mathbf{b} = \begin{bmatrix} 1 \\ 2 \\ 3 \\ 4 \end{bmatrix}$$

Part 2

Code the ability to read a sparse matrix as a set of triplets into either CSR or Linked List format and multiply the sparse matrix by a dense vector. Use this code to validate the solution to part 1 by checking that \mathbf{A} times \mathbf{x} will result in \mathbf{b} .

Turn in all code, input and output data.