

HW5

1. Problem 4.2.1

(a) Prove that if matrix U is upper triangular and invertible, then U^{-1} is upper triangular.

2. Problem 4.2.13

Show that every matrix of the form $A = \begin{pmatrix} 0 & a \\ 0 & b \end{pmatrix}$ has an Doolittle factorization. Here $a \neq 0$ and $b \neq 0$. Then show this factorization is not unique.

3. Problem 4.2.30

Find the Doolittle factorization of the matrix $A = \begin{pmatrix} 3 & 0 & 1 \\ 0 & -1 & 3 \\ 1 & 3 & 0 \end{pmatrix}$.

4. Problem 4.3.1 (a)

Use Gaussian elimination to solve

$$\begin{pmatrix} -1 & 1 & -4 \\ 2 & 2 & 0 \\ 3 & 3 & 2 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} = \begin{pmatrix} 0 \\ 1 \\ 1/2 \end{pmatrix}, \text{ and find the LU decomposition.}$$