

Math 401 Section 0401: Quiz 1

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Complete problems 1–2. Each of these problems is worth 5 points. Explain your steps carefully. If you use a *well known* theorem, make clear which theorem you are using and justify its use.

Problem 1: (5 pts). Find the LU factorization for the matrix A involved in the following linear system:

$$\begin{aligned}2x - y &= 10 \\2x - 5z &= 1 \\6x - y - 8z &= 2.\end{aligned}$$

Write explicitly the factors L and U .

Problem 1: (5 pts). Given the following LU factorization of A and the vector \mathbf{b} , find the solution \mathbf{x} to $A\mathbf{x} = \mathbf{b}$, where

$$A = \begin{pmatrix} 1 & 0 & 0 \\ 1 & 1 & 0 \\ 3 & 2 & 1 \end{pmatrix} \begin{pmatrix} 2 & -1 & 0 \\ 0 & 1 & -5 \\ 0 & 0 & 2 \end{pmatrix}, \quad \text{and} \quad \mathbf{b} = \begin{pmatrix} 1 \\ 1 \\ 5 \end{pmatrix}.$$

Hint: Do not multiply L and U to get A .