

Math 401 Section 0401: Quiz 2

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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). Let $A \in \mathbb{R}^{3 \times 3}$ be

$$A = \begin{pmatrix} 1 & 0 & 1 \\ a & a & a \\ b & b & a \end{pmatrix}.$$

For which real number a and b does the LU factorization exist? Write explicitly the factors L and U .

Problem 2: (5 pts). A square matrix is called *normal* if it commutes with its transpose: $A^T A = A A^T$. Find all normal 2×2 matrices.