Matrices and Linear Transformations
Homework Assignment 3
Due on Friday, September 19, at the start of class.

Your homework should have the cover sheet posted on Blackboard. If you use several sheets, please staple them. The problems should be written neatly and in the order they were assigned.

Section 1.6: Problems 6, 13, 40, 50, 52, 60.
Section 2.1: Problems 2, 8, 10, 14.

A. Find the $A = LU$ factorization for the matrix
\[
A = \begin{pmatrix}
1 & i & 3 & 1 + i \\
i & -1 & 1 + 3i & 1 \\
1 - i & 1 + i & 2 & 0
\end{pmatrix}.
\]

B. (i) Let $A$ be an $n \times n$ upper-triangular invertible matrix. Prove that $A^{-1}$ is an $n \times n$ upper-triangular matrix as well.
(ii) Use transposition and (i) to conclude that if $A$ is an $n \times n$ lower-triangular invertible matrix, then $A^{-1}$ is an $n \times n$ lower-triangular matrix as well.

C. Let $A$ be an invertible matrix and $A = LDU$. Explain why matrices $L$, $D$, $U$ are invertible. Use only the material we have learned so far.

D. Use Problems B and C to solve Problem 17 in Section 1.6.