

## Quiz 9

For the matrix below, find its LU factorization by following the indicated steps.

$$A = \begin{bmatrix} 3 & 3 & 2 & 11 & 6 \\ -3 & 1 & -2 & -1 & -5 \\ 15 & 9 & 10 & 30 & 6 \\ -9 & 1 & -6 & -2 & -5 \end{bmatrix}$$

1. (2 points) Set up the correct size and format of the matrices L and U.

L is a square 4x4 matrix, with ones along the diagonal, zeros above the diagonal, and some numbers below the diagonal.

U is a 4x5 matrix, which is the echelon form of the matrix A

2. (6 points) Compute the matrices L and U

There are many matrices that don't have an LU factorization. This matrix does have a factorization which looks similar to an LU factorization; however, when one tries to compute U, there are two possible U's that one could find. One, when multiplied by L, gives A but is not in echelon form. The other, when multiplied by L, does not give A but is in the correct form. Thus, we have that A has a factorization, but it is not an LU factorization.

3. (2 points) Verify that the matrices L and U you found in part 2 satisfy  $A = L \cdot U$