

Homework 8

Due Wednesday 2/1/17

1. Let $A = \begin{bmatrix} 1 & 1 \\ 3 & 6 \end{bmatrix}$.

- (a) Perform a single row operation to transform A into an upper triangular matrix U . What is the elimination matrix E_{21} used?
- (b) What is E_{21}^{-1} ?
- (c) In the $A = LU$ factorization for this example, what is L ?

2. Find the inverse of $E = \begin{bmatrix} 1 & 0 & 0 \\ a & 1 & 0 \\ b & c & 1 \end{bmatrix}$.

3. Let $A = \begin{bmatrix} 1 & 1 & 1 \\ 2 & 4 & 5 \\ 0 & 4 & 0 \end{bmatrix}$

- (a) What two elimination matrices E_{21} and E_{32} put A into echelon (not reduced!) form $E_{32}E_{21}A = U$?
- (b) From your answer to the previous part, find the LU factorization of A .

4. Let $L = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 1 & 1 & 0 & 0 \\ 1 & 2 & 1 & 0 \\ 1 & 3 & 3 & 1 \end{bmatrix}$. If $b = \begin{bmatrix} 1 \\ 0 \\ 0 \\ 0 \end{bmatrix}$ and $c = \begin{bmatrix} c_1 \\ c_2 \\ c_3 \\ c_4 \end{bmatrix}$, solve

$$Lc = b$$

by back substitution *from top to bottom*. That is, solve for c_1 first, then c_2 , etc.