

Name:

1. Let

$$A = \begin{pmatrix} 0 & 1 & 0 \\ 7 & 2 & 1 \\ \sqrt{5} & 0 & 3 \end{pmatrix}$$

and

$$B = \begin{pmatrix} 7 & 2 & 1 \\ 2\sqrt{5} & 1 & 6 \\ \sqrt{5} & 0 & 3 \end{pmatrix}.$$

The matrix  $A$  can be transformed into the matrix  $B$  using two elementary row operations.

(a) Find a matrix  $M$  such that  $MA = B$ .

(b) Find  $M^{-1}$ , if it exists.

2. Consider the following matrix.

$$C = \begin{pmatrix} 4 & -1 & 3 \\ 20 & -3 & 16 \\ -12 & -1 & -2 \end{pmatrix}$$

(a) Find a lower-triangular matrix  $L$  and an upper-triangular matrix  $U$  such that  $C = LU$ .

(b) Use your answer from part (a) to solve the following matrix equation for  $\mathbf{x}$ .

$$C\mathbf{x} = \begin{pmatrix} 5 \\ 28 \\ 6 \end{pmatrix}$$