Problem 1.

Consider row operations on matrices with 4 rows.

A. Consider the row operation $R_2 \leftrightarrow R_4$.

  i. Find the elementary matrix E corresponding to this row operation.
  ii. Find the inverse row operation.
  iii. From the last part, find E^{-1}.

B. Consider the row operation $R_3 \leftarrow 7R_3$.

  i. Find the elementary matrix E corresponding to this row operation.
  ii. Find the inverse row operation.
  iii. From the last part, find E^{-1}.

C. Consider the row operation $R_1 \leftarrow R_1 + 5R_3$.

  i. Find the elementary matrix E corresponding to this row operation.
  ii. Find the inverse row operation.
  iii. From the last part, find E^{-1}.

Problem 2.

In each part, find the elementary matrix E such that $EA = B$. Find E^{-1}. (For your own edification, check that $E^{-1}B = A$. You don't have to write down this calculation.)

A.

$$A = \begin{bmatrix} 1 & 5 & -9 & 7 \\ 2 & 0 & 1 & -3 \\ 1 & 2 & -4 & 5 \\ 2 & 1 & -3 & 10 \end{bmatrix}, \qquad B = \begin{bmatrix} 1 & 5 & -9 & 7 \\ -2 & -2 & 7 & -23 \\ 1 & 2 & -4 & 5 \\ 2 & 1 & -3 & 10 \end{bmatrix}$$

B.

$$A = \begin{bmatrix} 1 & 5 & -9 & 7 \\ 2 & 0 & 1 & -3 \\ 1 & 2 & -4 & 5 \\ 2 & 1 & -3 & 10 \end{bmatrix}, \qquad B = \begin{bmatrix} 1 & 2 & -4 & 5 \\ 2 & 0 & 1 & -3 \\ 1 & 5 & -9 & 7 \\ 2 & 1 & -3 & 10 \end{bmatrix}$$

C.

$$A = \begin{bmatrix} 1 & 5 & 7 \\ 3 & 2 & -1 \\ 4 & 5 & 9 \end{bmatrix}, \qquad B = \begin{bmatrix} 1 & 5 & 7 \\ 3 & 2 & -1 \\ 20 & 25 & 45 \end{bmatrix}$$

Problem 3. In each part, determine if the given matrix A is invertible and, if so, find the inverse. (Use the method discussed in class. You can just use the `rref` key on your calculator.)

A.

$$A = \begin{bmatrix} 3 & 46 & -21 & -21 \\ 3 & 44 & -21 & -20 \\ 1 & 11 & -6 & -5 \\ -12 & -201 & 82 & 93 \end{bmatrix}$$

B.

$$A = \begin{bmatrix} 0 & 32 & -32 & -3 \\ 1 & 9 & -7 & 1 \\ 3 & 28 & -22 & 3 \\ -1 & -26 & 24 & 1 \end{bmatrix}$$

Problem 4. In each case, find elementary matrices $E_1, E_2, \ldots, E_{k-1}, E_k$ so that $E_k E_{k-1} \ldots E_2 E_1 A$ is in Reduced Row Eschelon Form.

A.

$$A = \begin{bmatrix} 1 & 2 & 1 \\ 0 & 5 & -2 \\ 2 & -1 & 5 \end{bmatrix}$$

B.

$$A = \begin{bmatrix} 2 & -1 & -6 & 1 \\ 1 & -1 & -5 & 3 \\ 1 & 1 & 3 & -2 \\ 2 & 0 & -2 & 2 \end{bmatrix}$$

Problem 5.

In each part, the given matrix A is invertible. Find elementary matrices $E_1, E_2, \ldots, E_k$ so that $A = E_1 E_2 \ldots E_k$.

A.

$$A = \begin{bmatrix} -4 & -15 \\ 4 & 20 \end{bmatrix}$$

B.

$$A = \begin{bmatrix} -4 & 1 & -2 \\ 4 & 0 & 4 \\ 4 & -1 & 1 \end{bmatrix}$$

In the book, starting on page 76, do problems 5, 8, 9, 11 and 14.

Problem Set

Assignment #2

Math 2360, Summer II, 2002

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Good luck!