

Math 122-002 201730
Practice Assignment # 6

*Please remember that the assignment consists of only a sample of the kind of questions you are supposed to be able to do. It is **not** a safe practice to just do the assignment, and that is why there is a list of "suggested practice problems".*

1. Find a row operation and the corresponding elementary matrix that will restore the given elementary matrix to the identity matrix. Do the product to check that the elementary matrix actually performs the operation.

(a)
$$\begin{bmatrix} 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

(b)
$$\begin{bmatrix} 1 & 0 & 8 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

(c)
$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \end{bmatrix}$$

(d)
$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ -1/2 & 0 & 1 \end{bmatrix}$$

2. Use the inversion algorithm to find the inverse where possible. If the matrix is invertible, write the inverse as a product of elementary matrices.

(a)
$$\begin{bmatrix} 5 & 6 & 7 & 8 \\ 4 & 5 & 6 & 7 \\ 3 & 4 & 5 & 6 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

(b)
$$\begin{bmatrix} 0 & 0 & 2 & 0 \\ 1 & 0 & 0 & 1 \\ 0 & -2 & 3 & 0 \\ 2 & 1 & 5 & 3 \end{bmatrix}$$

(c)
$$\begin{bmatrix} 1 & 2 & 3 \\ 2 & 1 & 3 \\ 0 & 3 & 3 \end{bmatrix}$$

(d)
$$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 2 & 4 & 0 & 0 \\ 2 & 4 & 6 & 0 \\ 2 & 4 & 6 & 8 \end{bmatrix}$$

3. Find the value of c for which A has no inverse.

(a) $A = \begin{bmatrix} 1 & -2 \\ 3 & c \end{bmatrix}$.

(b) $A = \begin{bmatrix} 1 & -1 & c \\ 0 & 2 & 1 \\ -1 & 0 & 1 \end{bmatrix}$.

4. Show that if $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ with $ad - bc \neq 0$, then

$$A^{-1} = \frac{1}{ad - bc} \begin{bmatrix} d & -b \\ -c & a \end{bmatrix}.$$

5. Use the inverse matrix to solve the system

$$(a) \begin{cases} 3x - 2y = 5 \\ x + 4y = 6 \end{cases}$$

$$(b) \begin{cases} x + 4y + 2z = 1 \\ 2x + 3y + 3z = -1 \\ 4x + y + 4z = 0 \end{cases}$$

6. Find A if $(I + 3A)^{-1} = \begin{bmatrix} 2 & 0 \\ 1 & -1 \end{bmatrix}$.