# Matrix Algebra
## Elementary Matrices
### More Homework 5

For each of the following matrices $A$, find a matrix $E$ such that $EA$ is in row-echelon form. What is $EA$?

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

**Answer:** One possibility is:

$$E = \begin{pmatrix} 1 & 0 & 0 \\ 2 & -1 & 0 \\ 1/2 & -1/2 & 1/2 \end{pmatrix}$$

$$EA = \begin{pmatrix} 1 & 1 & 3 & 5 \\ 0 & 1 & 4 & 9 \\ 0 & 0 & 1 & 5 \end{pmatrix}$$

2.
$$A = \begin{pmatrix} 2 & 1 & 3 & 3 \\ 1 & 1 & 3 & 4 \\ 3 & 2 & 1 & 0 \end{pmatrix}$$

**Answer:** One possibility is:

$$E = \begin{pmatrix} 0 & 1 & 0 \\ -1 & 2 & 0 \\ 1/5 & 1/5 & -1/5 \end{pmatrix}$$

$$EA = \begin{pmatrix} 1 & 1 & 3 & 4 \\ 0 & 1 & 3 & 5 \\ 0 & 0 & 1 & 7/5 \end{pmatrix}$$

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

**Answer:** One possibility is:

$$E = \begin{pmatrix} 1/2 & 0 & 0 & 0 \\ -1/2 & 1 & 0 & 0 \\ 1/2 & -1 & 1 & 0 \\ 7/46 & -8/23 & 4/23 & 1/23 \end{pmatrix}$$

$$EA = \begin{pmatrix} 1 & 1 & 1 & 3 \\ 0 & 1 & 1 & -2 \\ 0 & 0 & 1 & 3 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$