Inverses

Consider the following matrices:

$$A = \begin{pmatrix} 1 & 2 \\ 2 & -2 \end{pmatrix} \tag{1}$$

$$B = \begin{pmatrix} 2 & 3 & 1 \\ 6 & 4 & 2 \\ 4 & -4 & 0 \end{pmatrix} \tag{2}$$

$$C = \begin{pmatrix} 2 & 2 \\ 3 & 1 \end{pmatrix} \tag{3}$$

Calculate the following quantities:

1. A^{-1}
2. B^{-1}
3. C^{-1}

Let A and B be invertible matrices of the same size. What can you say about the following:

1. $(AB)^{-1}$?
2. $(A^T)^{-1}$?
3. $(A^n)^{-1}$?

Elementary Matrices

Consider the following matrices:

$$E_1 = \begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix} \tag{4}$$

$$E_2 = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 3 \end{pmatrix} \tag{5}$$

$$E_3 = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 3 \\ 0 & 0 & 1 \end{pmatrix} \tag{6}$$

$$A = \begin{pmatrix} a & b & c \\ d & e & f \\ g & h & i \end{pmatrix} \tag{7}$$

Consider the following products:

1. $E_1 A$
2. $E_2 A$
3. $E_3 A$

Describe in words the effect of each of the matrix multiplications has on A.