1. Let \( A = \begin{bmatrix} 1 & 0 \\ 3 & 1 \end{bmatrix} \).
   
a) Show that \( A^2 - 2A + I = 0 \).
   
b) Show that \( 2I - A = A^{-1} \).

2. Let \( A = \begin{bmatrix} 3 & 7 \\ 0 & 1 \end{bmatrix} \).
   
a) Find elementary matrices \( E_1 \) and \( E_2 \) such that \( E_2 E_1 A = I \).
   
b) Write \( A^{-1} \) as a product of two elementary matrices.
   
c) Write \( A \) as a product of two elementary matrices.

3. Let \( A = \begin{bmatrix} 1 & 3 & 1 \\ 2 & 2 & 1 \\ 2 & 3 & 1 \end{bmatrix} \).
   
a) Find \( A^{-1} \).
   
b) Use \( A^{-1} \) to find the solution of \( Ax = \begin{bmatrix} b_1 \\ b_2 \\ b_3 \end{bmatrix} \).

4. Let \( A = \begin{bmatrix} 1 & 3 & 2 \\ 2 & 4 & 1 \\ 1 & -1 & -4 \end{bmatrix} \).
   
a) For which values of \( b_1, b_2, b_3 \) is the system \( Ax = \begin{bmatrix} b_1 \\ b_2 \\ b_3 \end{bmatrix} \) consistent?
   
b) Find the general solution whenever the system is consistent.

5. Let \( A = \begin{bmatrix} 4 & 0 & 1 \\ -2 & 1 & 0 \\ -2 & 0 & 1 \end{bmatrix} \). Recall that that \( Ax = 2x \) can be rewritten as \( (A - 2I)x = 0 \). Use this to solve \( Ax = 2x \).