1. Either show that the vectors $\begin{bmatrix} 0 \\ 2 \\ 3 \end{bmatrix}$, $\begin{bmatrix} 0 \\ 0 \\ -8 \end{bmatrix}$, $\begin{bmatrix} 1 \\ 3 \\ -1 \end{bmatrix}$ are linearly independent or express one as a linear combination of the others.

2. Either show that the columns of the matrix $\begin{bmatrix} -4 & -3 & 0 \\ 0 & -1 & 5 \\ 1 & 2 & -5 \\ 2 & 1 & -10 \end{bmatrix}$ are linearly independent or find a solution to the homogeneous problem.

3. Either show that the columns of the matrix $\begin{bmatrix} 1 & -2 & 3 & 2 \\ -2 & 4 & -6 & 2 \\ 0 & 1 & -1 & 3 \end{bmatrix}$ are linearly independent or find a solution to the homogeneous problem.

4. Find the inverses of these matrices if they exist:
   a. $\begin{bmatrix} 2 & 4 \\ 4 & 6 \end{bmatrix}$
   b. $\begin{bmatrix} 1 & 2 & -1 \\ -4 & -7 & 3 \\ -2 & -6 & 4 \end{bmatrix}$

5. Use the inverse found in Exercise 4a to solve the system
   $\begin{bmatrix} 2 & 4 \\ 4 & 6 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} 1 \\ -1 \end{bmatrix}$
6. Mark each statement True or False. Supply a **simple counterexample** for each false statement.

   a. If $A$ is invertible, then the inverse of $A^{-1}$ is $A$ itself.

   b. A product of invertible $n \times n$ matrices is invertible, and the inverse of the product is the product of their inverses in the same order.