1. Determine in each case if the given vectors are linearly independent. In each case there is a simple explanation "why."

   (a) $\begin{bmatrix} 0 \\ 0 \\ 2 \end{bmatrix}, \begin{bmatrix} 0 \\ 5 \\ -8 \end{bmatrix}, \begin{bmatrix} -3 \\ 4 \\ 1 \end{bmatrix}$

   (b) $\begin{bmatrix} -1 \\ 4 \end{bmatrix}, \begin{bmatrix} -2 \\ -8 \end{bmatrix}$

2. Determine in each case if the columns of the matrix form a linearly independent set. If they do not, give a non-trivial linear combination of the column vectors that is equal to $\mathbf{0}$.

   (a) $A = \begin{bmatrix} -4 & -3 & 0 \\ 0 & -1 & 4 \\ 1 & 0 & 3 \\ 5 & 4 & 6 \end{bmatrix}$

   (b) $A = \begin{bmatrix} 1 & -3 & 3 & -2 \\ -3 & 7 & -1 & 2 \\ 0 & 1 & -4 & 3 \end{bmatrix}$

3. Mark each of the following statements as True or False. A False answer should be accompanied by a counterexample.

   (a) If $\{\mathbf{u}, \mathbf{v}\}$ is linearly independent, and $\mathbf{w} \in \text{Span}\{\mathbf{u}, \mathbf{v}\}$, the $\{\mathbf{u}, \mathbf{v}, \mathbf{w}\}$ is linearly independent.

   (b) The columns of an 4×5 matrix are linearly dependent.

   (c) If a set of vectors in $\mathbb{R}^n$ is linearly dependent, then the set contains more than n vectors.

4. Find all values of h for which the set $\left\{ \begin{bmatrix} 1 \\ -1 \\ -3 \end{bmatrix}, \begin{bmatrix} -5 \\ 7 \\ 8 \end{bmatrix}, \begin{bmatrix} 1 \\ 1 \\ h \end{bmatrix} \right\}$ is linearly dependent.