1. Find a set consisting of one vector that spans the line in $\mathbb{R}^2$ described by the equation

$$3x - 4y = 0,$$

and show that it has this property.

2. Find a set of two vectors that spans the plane in $\mathbb{R}^3$ described by the equation

$$2x + y + 5z = 0,$$

and show that it has this property.

3. Let $A = \{\vec{v}_1, \vec{v}_2, \vec{v}_3\} \subseteq \mathbb{R}^3$, where:

$$\vec{v}_1 = \begin{bmatrix} -5 \\ -1 \\ 8 \end{bmatrix}, \quad \vec{v}_2 = \begin{bmatrix} -2 \\ 2 \\ 5 \end{bmatrix}, \quad \text{and} \quad \vec{v}_3 = \begin{bmatrix} 0 \\ 4 \\ 3 \end{bmatrix}.$$  

Is $\{\vec{v}_1, \vec{v}_2, \vec{v}_3\}$ a linearly independent set? (As always, prove your answer.)

4. Let $A = \{\vec{v}_1, \vec{v}_2, \vec{v}_3\} \subseteq \mathbb{R}^3$, where:

$$\vec{v}_1 = \begin{bmatrix} -3 \\ 2 \\ 1 \end{bmatrix}, \quad \vec{v}_2 = \begin{bmatrix} 1 \\ -3 \\ -1 \end{bmatrix}, \quad \vec{v}_3 = \begin{bmatrix} 4 \\ 0 \\ 3 \end{bmatrix}.$$  

Is $\{\vec{v}_1, \vec{v}_2, \vec{v}_3\}$ a linearly independent set? (As always, prove your answer.)

5. Let $A = \{\vec{v}_1, \vec{v}_2\} \subseteq \mathbb{R}^3$, where:

$$\vec{v}_1 = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}, \quad \vec{v}_2 = \begin{bmatrix} 1 \\ -1 \\ 1 \end{bmatrix}.$$  

Find a vector $\vec{v}_3 \in \mathbb{R}^3$ such that $\{\vec{v}_1, \vec{v}_2, \vec{v}_3\}$ is a linearly independent set, and prove that it is a linearly independent set.