

1. Consider the vector space $V = \mathbb{R}^3$. Suppose

$$\mathbf{v}_1 = \begin{bmatrix} 3 \\ 0 \\ -6 \end{bmatrix}, \mathbf{v}_2 = \begin{bmatrix} -4 \\ 1 \\ 7 \end{bmatrix} \quad \text{and} \quad \mathbf{v}_3 = \begin{bmatrix} -2 \\ 1 \\ 5 \end{bmatrix}$$

- (a) Determine if $\{\mathbf{v}_1, \mathbf{v}_2, \mathbf{v}_3\}$ is linearly independent.
- (b) Does $\{\mathbf{v}_1, \mathbf{v}_2, \mathbf{v}_3\}$ span V ?
2. Consider the collection of vectors $\mathcal{B} = \{\mathbf{b}_1, \mathbf{b}_2, \mathbf{b}_3\}$ in \mathbb{R}^3 , where

$$\mathbf{b}_1 = \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}, \mathbf{b}_2 = \begin{bmatrix} 1 \\ 2 \\ 0 \end{bmatrix} \quad \text{and} \quad \mathbf{b}_3 = \begin{bmatrix} 3 \\ 2 \\ 1 \end{bmatrix}.$$

Show that \mathcal{B} is a basis for $V = \mathbb{R}^3$.