4-4 In-Class Exercise

1. Determine whether the vectors are linearly independent or are linearly dependent in R^3.

$$(-3, 0, 4),\ (5, -1, 2),\ (1, 1, 3)$$

2. Determine whether the three vectors lie on the same line in R^3.

(a) $\mathbf{v}_1 = (-1, 2, 3),\ \mathbf{v}_2 = (2, -4, -6),\ \mathbf{v}_3 = (-3, 6, 0)$

(b) $\mathbf{v}_1 = (4, 6, 8),\ \mathbf{v}_2 = (2, 3, 4),\ \mathbf{v}_3 = (-2, -3, -4)$

4-4 Suggested Exercises

1. Determine whether the vectors are linearly independent or are linearly dependent in P_2.

$$2 - x + 4x^2,\ 3 + 6x + 2x^2,\ 2 + 10x - 4x^2$$

2. Determine whether the matrices are linearly independent or dependent.

$$\begin{bmatrix} 1 & 0 \\ 1 & 2 \end{bmatrix}, \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}, \begin{bmatrix} 0 & 1 \\ 2 & 1 \end{bmatrix} \text{ in } M_{22}$$

3. Show that the three vectors $\mathbf{v}1 = (0, 3, 1, -1)$, $\mathbf{v}2 = (6, 0, 5, 1)$, and $\mathbf{v}3 = (4, -7, 1, 3)$ form a linearly dependent set in R^4.

4. In each part, let $T_A : R^3 \rightarrow R^3$ be multiplication by A, and let $\mathbf{u}_1 = (1, 0, 0)$, $\mathbf{u}_2 = (2, -1, 1)$, and $\mathbf{u}_3 = (0, 1, 1)$. Determine whether the set $\{T_A(\mathbf{u}_1), T_A(\mathbf{u}_2), T_A(\mathbf{u}_3)\}$ is linearly independent in R^3.

$$A = \begin{bmatrix} 1 & 1 & 2 \\ 1 & 0 & -3 \\ 2 & 2 & 0 \end{bmatrix}$$