1. In each case determine whether $S$ is linearly dependent, and whether $\vec{y} \in \text{Span}(S)$.

(a) $V = \mathbb{R}^3$, $S = \left\{ \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}, \begin{bmatrix} 2 \\ 3 \\ 4 \end{bmatrix} \right\}$, $\vec{y} = \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}$

(b) $V = P_2(\mathbb{R})$, $S = \{1 + x, -1 + x^2, 1 + 2x + x^2\}$, $\vec{y} = 2 + x - x^2$

(c) $V = C^\infty(\mathbb{R}, \mathbb{R})$, $S = \{1, \sin^2 x, \cos^2 x\}$, $\vec{y} = x^2$

2. Let $S$ be a subset of the vector space $V$ and let $\vec{z} \in \text{Span}(S)$. Prove that $\text{Span}(S \cup \{\vec{z}\}) = \text{Span}(S)$.

The following problems are strongly recommended, but should not be turned in:

1.6: 1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13
2.1: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 15, 16