1. Let \((V, +, \cdot)\) be a vector space, \(\{u_1, \ldots, u_m\} \subset V\) and \(\{v_1, \ldots, v_m\} \subset V\). Prove:
\[
\{u_1, \ldots, u_m\} \text{ spans } V, \quad \{v_1, \ldots, v_m\} \text{ linearly independent } \Rightarrow m \leq m
\]

2. Prove that if \(V\) and \(W\) are three-dimensional subspaces of \(\mathbb{R}^5\), then \(V\) and \(W\) must have a non-zero vector in common.

3. Find a basis for the vector space of \(3 \times 3\) symmetric matrices.

4. Let \((V, +, \cdot)\) be a vector space, \(\{v_1, v_2, v_3\} \subset V\) linearly independent. Analyze the linear independence/dependence of \(\{w_1, w_2, w_3\}\) for \(w_1 = v_1 + v_2\), \(w_2 = v_1 + v_3\), \(w_3 = v_2 - v_3\).