

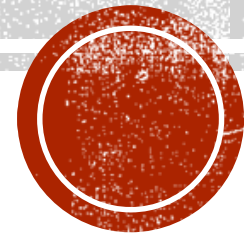
THEOREM

Let V and W both be subspaces of the vector space U . Then $V \cap W$ (the intersection of V and W) is also a subspace of U .



SPANNING SETS & LINEAR INDEPENDENCE

Section 4.4



SPANNING SETS

Let $S = \{\mathbf{v}_1, \mathbf{v}_2, \dots, \mathbf{v}_k\}$ be a subset of vector space V . S is called a **spanning set** of V if *every* vector in V can be written as a linear combination of the vectors in S . In this case, we say that S **spans** V .



TERMINOLOGY

Let $\mathbf{v}_i \in \mathbb{R}^n$; $\text{span}\{\mathbf{v}_1, \mathbf{v}_2, \dots, \mathbf{v}_k\}$ is called the **subset of \mathbb{R}^n spanned by (or generated by) $\mathbf{v}_1, \mathbf{v}_2, \dots, \mathbf{v}_k$.**



EQUIVALENT QUESTIONS

1. Is $\mathbf{b} \in \text{span}\{\mathbf{v}_1, \mathbf{v}_2, \dots, \mathbf{v}_k\}$?
2. Can \mathbf{b} be written as a linear combination of the \mathbf{v}_i 's?
3. Can the \mathbf{v}_i 's "generate" \mathbf{b} ?
4. Does $\left[\mathbf{v}_1 \ \mathbf{v}_2 \ \cdots \ \mathbf{v}_k \mid \mathbf{b} \right]$ have a solution?

