# Solution to the Quiz for June 17, 2003

**Let $U$ and $V$ be subspaces of $\mathbb{R}^n$. Prove that the intersection, $U \cap V$, is also a subspace of $\mathbb{R}^n$.**

Zero is in $U \cap C$: We know that zero is in $U$ because $U$ is a vector space. We know that zero is in $V$ because $V$ is a vector space. Thus, zero is in $U \cap V$.

$U \cap C$ is closed under addition: Take $x$ and $y$ from $U \cap C$. We know that $x, y \in U$ and $U$ is a vector space. It follows that $x + y \in U$. We know that $x, y \in V$ and $V$ is a vector space. It follows that $x+y \in V$. Now we know that $x+y \in U \cap V$.

$U \cap C$ is closed under scalar multiplication: Take $x$ in $U \cap V$ and $r \in \mathbb{R}$. We know that $x \in U$, $r$ is a scalar, and $U$ is a vector space. It follows that $rx \in U$. We know that $x \in V$, $r$ is a scalar, and $V$ is a vector space. It follows that $rx \in V$. Now we know that $rx \in U \cap V$.