

Question 1. *Let V be a finite dimensional vector space and W a subspace of V . Prove that W is also finite dimensional.*

Solution. Suppose the dimension of W is infinite. This means that there is an infinite linearly independent subset $\{w_i\}_{i=1}^{\infty}$ of W . But W is a subspace of V , in particular, $W \subseteq V$. So, $\{w_i\}_{i=1}^{\infty}$ is also a subset of V . Therefore, $\dim V = \infty$; a contradiction. \square