University of Toronto Scarborough Campus
Department of Computer and Mathematical Sciences

These solutions are not the only "perfect" or "10/10" solutions to be followed as a model. They are examples of ways to solve these problems. There are many many alternative ways to solve these problems. We hope that these example solutions help you check your work.

Problems

Q1. Let $S \subseteq V$ be a subset of a vector space. Recall that the span of S is:

$$\text{span}(S) = \{a_1\mathbf{v}_1 + a_2\mathbf{v}_2 + \cdots + a_n\mathbf{v}_n : a_i \in \mathbb{R} \text{ and } \mathbf{v}_i \in V\}.$$

Alternatively, $\text{span}(S)$ is the set of finite linear combinations of elements from S.

Prove the following:

(a) $S \subseteq \text{span}(S)$

Solution: Every vector $\mathbf{v} \in S$ can be written as $1 \cdot \mathbf{v}$, a linear combination of elements of S.

(b) If $S \subseteq T$ then $\text{span}(S) \subseteq \text{span}(T)$