1. A function $f : \mathbb{R} \to \mathbb{R}$ is even if $f(x) = f(-x)$ for all $x \in \mathbb{R}$. Define addition and scalar multiplication of functions so that the set of even functions is a vector space over $\mathbb{R}$. Prove your answer.

2. Prove that a subset $W$ of a vector space $V$ is a subspace of $V$ if and only if the following two conditions are satisfied:

(a) $0 \in W$;
(b) if $x, y \in W$ and $a \in F$, then $ax + y \in W$. 