1. Let A and B be nonempty subsets of $\mathbb{R}$. Define $A + B = \{a + b : a \in A, b \in B\}$. Show $\sup(A + B) = \sup A + \sup B$.

2. Let $A \subset \mathbb{R}$ with $\emptyset \neq A$. Set $-A = \{-a : a \in A\}$ and show $-\sup A = \inf(-A)$.

3. Let $A \subset \mathbb{R}$ with $\emptyset \neq A$. Set $\alpha = \sup A$ and suppose $\alpha < \infty$. Also suppose there exists a $\delta > 0$ such that for all distinct a and b in A we have $|a - b| \geq \delta$. Show $\alpha \in A$.

4. Let $A \subset \mathbb{R}$ with $\emptyset \neq A$ and A bounded. Fix $x, y \in \mathbb{R}$. Set $T = \{ax + y : a \in A\}$ and find $\sup T$.