EP6-1 Suppose $D$ is a non-empty closed subset of $\mathbb{R}$. Let

$$\text{dist}(x, D) = \inf\{|x - y| : y \in D\}.$$ 

(a) Show that for each $x \in \mathbb{R}$ there is a $y \in D$ with $\text{dist}(x, D) = |x - y|$.
(b) Show that $f(x) = \text{dist}(x, D)$ is a continuous function.
(c) Show that $D = \{x \in \mathbb{R} : f(x) = 0\}$. 