(a) Suppose E and F are nonempty closed bounded subsets of $\mathbb{C}$. Show that there exist $z_0 \in E$ and $w_0 \in F$ such that

$$| z_0 - w_0 | = \inf\{| z - w | ; z \in E, w \in F\}.$$

(b) Show that this is not true if the boundedness condition on E and F is dropped.

(c) What if only one of E or F is bounded (but both are still closed)?