

**Exercise 1. Compact Sets**

(a) Let  $(K_j)_{j \in J}$  be an arbitrary family of compact sets. Show that

$$K := \bigcap_{j \in J} K_j$$

is also compact.

(b) Let  $K_1, K_2 \subset \mathbb{R}$  be compact in  $\mathbb{R}$ . Show that

$$K := \{x + iy \in \mathbb{C} \mid x \in K_1, y \in K_2\}$$

is compact in  $\mathbb{C}$ .