Math 551 - Topology I Homework 3 Fall 2017

- 1. Let *X* and *Y* be spaces, and let $B \subseteq Y$ be a subset, equipped with the subspace topology. Show that continuous functions $f : X \longrightarrow B$ correspond bijectively to continuous functions $g : X \longrightarrow Y$ whose image is contained in *B*.
- 2. Let *X* be a space and $A \subseteq X$ a subset. Show that $\overline{X \setminus A} = X \setminus \text{Int } A$, and use this to show that ∂A is always closed.
- 3. Let $A, B \subseteq X$.
 - (a) Show that $\overline{A \cup B} = \overline{A} \cup \overline{B}$.
 - (b) Show that $\bigcup_i \overline{A_i} \subset \overline{\bigcup_i A_i}$. Give an example to show that equality need not hold in general.
- 4. Recall the *generic point* topology (HW2.4(a)) on a set *X*. Describe the closure in *X* of a subset $A \subseteq X$.
- 5. Recall the *vertical interval* topology (HW2.5) on \mathbb{R}^2 . Describe the closure of the open unit square $(0,1) \times (0,1)$.