# Math 118: Homework 1

**1.** Let $a$ and $b$ be real numbers with $a < b$. Find the supremum and infimum of the set $S = \{x \in \mathbb{R} : (x-a)(x-b) < 0\}$.

**2.** Chapter 1, Exercise #5.

**3.** (a) For sets $A$ and $B$ of real numbers that are bounded above, let $a = \sup A$, $b = \sup B$ and prove that $\sup C = a + b$ where $C$ is the set

$$C = \{x + y : x \in A, y \in B\}.$$

(b) Find sets $A$ and $B$ bounded above and below such that $\sup D \neq ab$ where $D$ is the set

$$D = \{xy : x \in A, y \in B\}$$

and $a = \sup A$, $b = \sup B$.

**4.** (a) Chapter 1, Exercise #9.

(b) For the order defined in part (a) on the set $\mathbb{C}$, are the requirements (i) and/or (ii) in the definition of an ordered field true?

(c) Chapter 1, Exercise #8. This shows that no matter what order we define on the set $\mathbb{C}$, it will not be an ordered field.

**5.** Chapter 1, Exercise #6.