**MATH 203: Homework 1**

Due Wednesday Oct 5

Problems are from Rudin 3rd edition. Read the section **Fields** from Chapter 1 of Rudin.

**Problem 1.** Rudin Ch. 1 (p. 21-23) problems 1, 2, 5.

**Problem 2.** Consider an ordered set $S$, with $A$, $B$ subsets of $S$. If $A \subset B$ prove that:

$$\inf B \leq \inf A \leq \sup A \leq \sup B.$$

**Problem 3.** Compute, carefully justifying your result, the supremum and infimum in $\mathbb{R}$ of the set,

$$E = \left\{ \frac{1}{2} - \frac{1}{n} : n = 1, 2 \dots \right\}$$

**Problem 4.** Let $E \subset \mathbb{R}$ non-empty and bounded above. Show that $\alpha = \sup E$ if and only if $\alpha$ is an upper bound for $E$ and, for every $n \in \mathbb{N} \setminus \{0\}$, there is $x \in E$ with $x > \alpha - \frac{1}{n}$.

**Problem 5.** Rudin Ch. 1 (p. 21-23) problems 7,11,12,13.