Math 4110/5110, Introduction to Modern Analysis, Fall 2014 Homework #1

Due In Class: Thursday, September 4

Reading: If you haven't done so yet, read *Some Remarks on Writing Mathematical Proofs* by John M. Lee, available at

`http://www.math.washington.edu/~lee/Writing/writing-proofs.pdf`

Finish reading Chapter 1 and start reading Chapter 2 in the textbook.

Turn in the following problems. Exercise a.b refers to Exercise b in Chapter a of the textbook.

Problem A: Exercise 1.4.

Problem B: Let $A \subseteq \mathbb{R}$ be bounded from below and let $x \in \mathbb{R}$. Prove that $x = \inf A$ if and only if x is a lower bound for A and for all $\varepsilon > 0$ there exists $a \in A$ such that $a < x + \varepsilon$.
(We did half of this claim in class. Remember to prove both implications.)

Problem C: Exercise 1.6.

Problem D: Exercise 1.9.

Problem E: Let $1^* = \{p \in \mathbb{Q} : p < 1\}$; you may use without proof that 1^* is a Dedekind cut. Prove that 1^* is a multiplicative identity on the set of cuts, i.e. $\alpha 1^* = \alpha$ for all cuts α.