Math 4110/5110, Introduction to Modern Analysis, Fall 2014 Homework #0

Due In Class: Thursday, September 3

Reading: Read *Some Remarks on Writing Mathematical Proofs* by John M. Lee, available at
`http://www.math.washington.edu/~lee/Writing/writing-proofs.pdf`

Read Chapter 1 in Rudin's *Principles of Mathematical Analysis, 3rd Edition* ("*the textbook*").

Prove each of the following statements.

Theorem 1. *Let $x, y \in \mathbb{R}$. If $x < y$, then there exists $\varepsilon > 0$ such that $x + \varepsilon < y$.*

Theorem 2. *Let $x, y \in \mathbb{R}$. The following are equivalent:*

(1) $x \leq y$;
(2) $x < y + \varepsilon$ *for all* $\varepsilon > 0$*; and,*
(3) $x \leq y + \varepsilon$ *for all* $\varepsilon > 0$.

Do Theorem 1 and Theorem 2 hold in any ordered field?