Math 299 **Homework assignment, due 11/20**

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1. Let A and B be bounded subsets of $\mathbb{R}$ such that $A \subseteq B$. Prove that $\inf(B) \leq \inf(A)$.

2. Using only the axioms for $\mathbb{R}$, show that 1 is a positive real number.

   Hint:

   (a) Assume, by way of contradiction, $1 \notin \mathbb{R}^{>0}$.

   (b) Using Axiom 8.26(iv) what can you conclude about -1?

   (c) Show that $(-1)\cdot(-1) = 1$ by starting from $0 \cdot 0 = (-1+1)\cdot(-1+1)$, and using uniqueness of the additive inverse (this is not an axiom but we have proven this in class for groups). What axiom allowes you to expand the expression?

   (d) Use Axiom 8.26(ii) - what can you conclude about 1? Why is this a contradiction?

   (e) Clearly state your conclusion.