

PROBLEM SET NO. 2 (DUE ON MONDAY, OCTOBER 14 AT
4:00 PM)

TUESDAY 10-7

- **Problem 4:** Prove or disprove that the following sets have a supremum or an infimum in \mathbb{R} and if they do, find them. Also decide which of these sets have a maximum or a minimum.
 - (i) $\{\frac{1}{n} : n \in \mathbb{N}\}$
 - (ii) $\{x \in \mathbb{R} : x^2 + x + 1 \geq 0\}$
 - (iii) $\{x \in \mathbb{Q} : 0 \leq x \leq \sqrt{2}\}$
- **Problem 5:** Define $A \subseteq \mathbb{R}$ to be the set $A = \{r \in \mathbb{R} \mid 0 \leq r^2 < 2\}$. Let $x = \sup(A)$. Prove that $x^2 > 2$ is impossible. (Remember we did this for $x^2 < 2$ in class.)