

Math 131A Winter 2018: Homework 2, Due 1/26

1. Let $E := \{x \in \mathbb{R}, x > 0 : x^2 < 2\}$. In class we showed that $a := \sup E$ exists. Our goal is to show that $a^2 = 2$.

We showed in class that a contradiction occurs if $a^2 > 2$. Complete the proof by showing that a contradiction occurs if $a^2 < 2$.

2-3. Exercise 4.12, 4.14 (b).

4. Suppose (s_n) is a sequence and suppose $s_n \rightarrow s \in \mathbb{R}$. Show that the set $S := \{s = s_n \text{ for some } n \in \mathbb{N}\}$ is bounded.

5. Show that any real number $x \in \mathbb{R}$ can be obtained as the limit of a sequence (r_n) of rational numbers.

6-8. Exercises 8.4, 8.5, 8.10.