Winter 2026 Math 131A
Homework Assignment 2

Problem 1. Ross 4.6, 4.7, 4.14, 4.15, 4.16

Problem 2. Ross 5.4, 5.5

Problem 3. Let $S \subseteq \mathbb{R}$ be nonempty that is bounded from above. Let $b > 0$. Define $bS = \{bs : s \in S\}$. Show that bS has a least upper bound and

$$\sup(bS) = b \sup(S).$$

Problem 4. In this exercise, we show that the set of irrational numbers is dense in $\mathbb{R}$.

(a) Let $r \in \mathbb{Q}$. Prove that $r + \sqrt{2}$ must be irrational.

(b) Let $a < b$. Show that there exists an irrational number z such that $a < z < b$.