Winter 2026 Math 131A
Homework Assignment 8

Problem 1. Ross 17.8, 17.9(b)(c)(d), 17.10(b)

Problem 2. Ross 18.6, 18.8, 18.10

Problem 3. Ross 19.2(b), 19.4(a)

Problem 4. Let f be a function that is continuous at $x_0 \in \text{dom}(f)$. Suppose that $f(x_0) > 0$. Prove that there exists some $\delta > 0$ such that if $|x - x_0| < \delta$ then $f(x) > 0$.

Problem 5. (a) Suppose that h is continuous on $\mathbb{R}$ and that $h(r) = 0$ for every rational number $r \in \mathbb{Q}$. Prove that $h(x) = 0$ for all $x \in \mathbb{R}$.

(b) Let f and g be two continuous functions on $\mathbb{R}$ such that $f(r) = g(r)$ for every rational number $r \in \mathbb{Q}$. Prove that $f(x) = g(x)$ for all $x \in \mathbb{R}$. *Hint: use part (a)*

Problem 6. Let f be a function defined on $\mathbb{R}$. Suppose there exists a constant $M > 0$ such that

$$|f(x) - f(y)| \leq M|x - y| \quad \text{for all } x, y \in \mathbb{R}.$$

Prove that f is continuous on $\mathbb{R}$.