Winter 2026 Math 131A
Homework Assignment 9

Problem 1. Ross 20.11(c)

Problem 2. Ross 28.6(b), 28.14

Problem 3. Ross 29.4, 29.18

Problem 4. Let $f(x) = x^n$, where $n \in \mathbb{N}$. Compute $f'(x)$.

Problem 5. Let f and g be uniformly continuous on $\mathbb{R}$. Prove that the composition $g \circ f$ is also uniformly continuous on $\mathbb{R}$.

Problem 6. Let $f\colon (0,1) \to \mathbb{R}$ be a differentiable function such that $|f'(x)| \leq 1$ for all $x \in (0,1)$. Prove that f is uniformly continuous on $(0,1)$.

Problem 7. Let $f, g\colon [a,b] \to \mathbb{R}$ be two continuous functions on $[a,b]$ and differentiable on (a,b). Prove that there exists some $x \in (a,b)$ such that

$$f'(x)(g(b) - g(a)) = g'(x)(f(b) - f(a)).$$

Hint: consider the function $h(x) = f(x)(g(b) - g(a)) - g(x)(f(b) - f(a))$.