

Math 301, Spring 2025 — Homework 9

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Due April 25 at 5:00 pm

Instructions. This problem set contains problems mostly from Week 12 of class. The problem numbers refer to our textbook, *Understanding Analysis* by Stephen Abbott.

Problem 1. Please do the following textbook problems: Exercises 5.2.1, 5.2.2, 5.2.3c, 5.2.5, 5.2.7, 5.3.2, 5.3.7, 5.3.8

Remark 1. In Exercise 5.2.5, assume that $a \in \mathbb{R}$.

Remark 2. A function $f : A \rightarrow \mathbb{R}$ is *one-to-one* on A if $f(x) \neq f(y)$ for all $x, y \in A$ such that $x \neq y$.

Problem 2. Let A be an interval and suppose that $f : A \rightarrow \mathbb{R}$ is differentiable on A and $f'(x) \leq 0$ for all $x \in A$. Use the Mean Value Theorem to prove that f is decreasing on A .

Remark 3. A function $f : A \rightarrow \mathbb{R}$ is *decreasing* on A if $f(x) \geq f(y)$ for all $x, y \in A$ such that $x \geq y$.