

Math 301, Spring 2025 — Homework 3

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Due February 21 at 5:00 pm

Instructions. This problem set contains problems mostly from Week 3 of class. The problem numbers refer to our textbook, *Understanding Analysis* by Stephen Abbott.

Problem 1. Please do the following textbook problems: Exercises 2.2.2, 2.2.4ab, 2.2.6 , 2.2.7, 2.3.7, 2.3.9ab, 2.3.10cd

Remark 1. In Exercise 2.2.2, give proofs like the examples from Monday, February 10.

Remark 2. In Exercise 2.2.6, we started the proof in class on Wednesday, February 12. Your job in this problem is to finish that proof and write up the complete proof.

Remark 3. To make Exercise 2.3.9b more precise, give example sequences (a_n) and (b_n) where (a_n) is bounded, $b_n \rightarrow b$ for some $b \neq 0$, and $(a_n b_n)$ does not converge.

Problem 2. Prove that the sequence (a_n) given by $a_n = \sin(2n\pi/3)$ for each $n \in \mathbb{N}$ diverges using a proof by contradiction.