Discretionary Note

Anish Krishna Lakkapragada

IF YOU USE THIS FILE TO CHEAT, YOU ARE NOT ONLY STUPID BUT YOU ARE CHEATING YOURSELF OUT OF THE ABILITY TO FALL IN LOVE WITH MATH. Furthermore, I am not smarter than you and my solutions did not always get a perfect score.

CONTENT STARTS ON NEXT PAGE.

To access the general instructions for this repository head here.

Math 244 - Problem Set 3

due Monday, February 10, 2025, at 11:59pm

Section 2.3

1. How many linear extensions of $\mathcal{B}_2$ are there, and what about $\mathcal{B}_3$?

5. (optional bonus problem) ~~Prove that not every finite poset admits an embedding into the ordered set of triples of real numbers as in Example 2.1.1.~~ *Note from Prof. Hall: This problem as stated seems to be unnecessarily difficult, so we are replacing it with a simpler problem:* Prove that not every finite poset admits an embedding into the poset $(\mathbb{N}^2, \preceq)$, where $(x_1, y_1) \preceq (x_2, y_2)$ if and only if $x_1 \leq x_2$ and $y_1 \leq y_2$.

Section 2.4

3. Find a sequence of real numbers of length 16 that contains no monotone subsequence of length 5. *Note from Prof. Hall: The version in the textbook has "17" instead of "16", but this is a typo.*

4. Prove the following strengthening of Theorem 2.4.6: Let k, ℓ be natural numbers. Then every sequence of real numbers of length $k\ell+1$ contains a nondecreasing subsequence of length $k+1$ or a decreasing subsequence of length $\ell + 1$.

Section 3.1

2. Determine the number of ordered pairs (A, B), where $A \subseteq B \subseteq \{1, 2, \ldots, n\}$.

6. Show that a natural number $n \geq 1$ has an odd number of divisors (including 1 and itself) if and only if $\sqrt{n}$ is an integer. *The textbook has a hint to this problem in the back.*