

## MATH 311: Homework 2

Due: February 3, 2021

1. Upcoming office hours are Monday February 1 3:30-4:30 and Wednesday February 3 9:00-10:00.
2. Read Sections 1.4-5 and 2.1 in Abbott. You may wish to skim Section 1.6, since it contains the argument for the uncountability of  $\mathbb{R}$  that we will present in class.
3. Do Abbott Exercise 1.2.3. You don't have to prove the true statements, just provide counterexamples for the false ones.
4. Do Abbott Exercise 1.2.5 part (c). [We did parts (a) and (b) in lecture and your proof should look similar.]
5. Do Abbott Exercises 1.2.11, 1.3.5, 1.3.6, 1.3.8, 1.4.5
6. Given a set  $S$  in  $\mathbb{R}$ , let  $-S$  be the set  $\{-s : s \in S\}$ .
  - (a) Prove that if  $S$  is bounded below,  $-S$  is bounded above and  $\sup(-S) = -\inf S$ .
  - (b) Use this to conclude that the Axiom of Completeness implies that every bounded below subset of  $\mathbb{R}$  has an infimum.

[Remark: Abbott Exercise 1.3.3 contains a different proof of this fact.]