

## Homework 1: Infimums, Supremums (Due 2/7/2024)

*Assignments should be **stapled** and written clearly and legibly.*

1. §3.3, #3(b), (d), (g), (h), 5, 8.
2. Suppose that  $A$  and  $B$  are two nonempty sets of real numbers such that  $x \leq y$  for all  $x$  in  $A$  and  $y$  in  $B$ . In this problem you will prove that  $\sup A \leq \inf B$ .
  - (a) Give an upper bound for  $A$  and give a lower bound for  $B$ .
  - (b) Explain how we know that both  $\sup A$  and  $\inf B$  must exist.
  - (c) **Prove** that  $\sup A \leq y$  for all  $y \in B$ .
  - (d) Use part (c) and the definition of  $\inf B$  to **prove** that  $\sup A \leq \inf B$ .
  - (e) Can one say that  $\max A \leq \min B$ ? Justify your answer.