Homework 2: Ordered Fields, More Supremums (Due 2/12/2021)

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

1. §3.2, # 3(j).
2. Find a rational number between π and $\sqrt{10}$. Express your answer in the form a/b, where $a, b \in \mathbb{Z}$.
3. Suppose that A and B are bounded sets and that $\sup A < \sup B$. Prove that there exists $b \in B$ that is an upper bound for A. Then show by example that this is not always the case if we only assume $\sup A \leq \sup B$.
4. Let $a < b$ be real numbers and consider the set $T = \mathbb{Q} \cap [a, b]$.
   (a) Prove that $\sup T = b$. You may use any of the theorems we've proved in class.
   (b) Show by example that it is not always the case that $\max T = b$ (proof not needed for this part).
5. §2.3, #5, 7(b), (c), (e).