MATH310 Homework 2022-08-15 (Last One!)
Due Gradescope 11:59pm 2022-08-17

1. Give an example of a set $S \subseteq \mathbb{R}$ consisting of a denumerable set of points (so not an interval) which has an supremum but no maximum. No proof is necessary. [10 pts]

2. Prove that the supremum of $(1, 2)$ is not 3. Do not do this by showing the supremum is something else but but by proving that 3 does not satisfy the definition of the supremum. [30 pts]

3. We know $(0, 1)$ is uncountable. Use this fact to prove that every interval (x_0, x_1) is uncountable. [30 pts]

4. Prove that if A and B are countable then so is $A \cup B$. [30 pts]