# Math 2050, HW 1. Due: 23 Sep 2022

(1) Find the supremum and infimum of the set

$$S = \{x \in \mathbb{R} : x < \frac{1}{x}\}.$$

Justify your answer.

(2) Suppose $S$ is a non-empty subset of $\mathbb{R}$ which is bounded from above. Show that $\sup S = -\inf\{-s : s \in S\}$.

(3) Show that if $A, B$ are bounded subsets of $\mathbb{R}$. Show that

$$\sup(A + B) = \sup A + \sup B, \quad \text{and} \quad \inf(A + B) = \inf A + \inf B$$

(4) Let $x > 0$, show that there is $n \in \mathbb{N}$ such that $\frac{1}{2^n} < x$.

(5) Let $x > 0$, show that there exists a unique $m \in \mathbb{N}$ such that $m \leq x < m + 1$. (In this case, we call such $m$ as $[x]$).