Math 2050, HW 1

(1) Let $S = \{1 + \frac{(-1)^n}{n} : n \in \mathbb{N}\}$, find $\sup S$ and $\inf S$. Justify it.
(2) Let S be a non-empty subset of $\mathbb{R}$. Show that $u \in \mathbb{R}$ is an upper bound of S if and only if the following holds: For any $t \in \mathbb{R}$, $t > u$ implies $t \notin S$.
(3) Show that if A, B are bounded subsets of $\mathbb{R}$, then $A \cup B$ is a bounded subset and $\sup(A \cup B) = \max\{\sup A, \sup B\}$.
(4) Let S be a bounded subset of $\mathbb{R}$ and S_0 be a non-empty subset of S, then we have

$$\inf S \leq \inf S_0 \leq \sup S_0 \leq \sup S.$$