Department of Mathematics and Statistics
Elements of Set Theory I, Spring 2025

Course exam

1. Simplify $\bigcup(A \cap B)$, where $A = \{\emptyset, \{\emptyset\}, \{\emptyset, \{\{\emptyset\}\}\}\}$ and $B = \{\emptyset, \{\emptyset\}, \{\{\emptyset\}\}\}$.
2. Show that for non-empty sets A and B:
$$\bigcap(A \cup B) = (\bigcap A) \cap (\bigcap B).$$
3. Recall that a set A is transitive if the following holds for all a and x:
$$x \in a \in A \Rightarrow x \in A.$$
Show that if a set A satisfies $A \subseteq \mathcal{P}A$ (the power set of A), then A is transitive.
4. Let A be a non-empty subset of ω. Show that if $A = \bigcup A$, then $A = \omega$. (Hint: show that A is inductive.)