

## Logic II — Richard Zach

Phil 379 Lo1 — Winter 2016

### Problem Set #1

This assignment is due on **Tuesday, January 26 at 12:30 pm**. You can turn it in in class or in the dropbox labelled “Logic II (379 Lo3)—Richard Zach” in the Philosophy Department. The dropbox is cleared at 4 pm.

1. List all elements of the relation  $\subseteq$  on  $\wp(\{1, 2, 3\})$ . Every relation on a set can be considered as a graph. Draw the graph with vertices  $\wp(\{1, 2, 3\})$  and edges  $\subseteq$ .
2. Prove in detail that  $X \cup (X \cap Y) = X$ . Then compress it into a “textbook proof.”
3. Show by induction that if  $X$  has  $n$  elements, then  $\wp(X)$  has  $2^n$  elements.
4. Give examples of relations that are (a) reflexive and symmetric but not transitive, (b) reflexive and anti-symmetric, (c) anti-symmetric, transitive, but not reflexive, and (d) reflexive, symmetric, and transitive. Do not use relations on numbers or sets.
5. Show that if  $f: X \rightarrow Y$  and  $g: Y \rightarrow Z$  are both injective, then so is  $(g \circ f)$ .