Logic Qualifing Exam
January 2009

Answer six questions and at least one from each section.

Section 1

1. Sketch the proof of Godel's Completeness Theorem for Predicate Logic and explain the use of Henkin constants (or Skolem functions).

2. Show that for any elementary chain $\{\mathcal{A}_i\}_{i\in\omega}$ of structures, $\mathcal{A}_i$ is an elementary submodel of the union $\mathcal{A}$

3. Show that the theory of dense linear orderings without end points is complete and decidable.

Section 2

4. Suppose $2 \leq \kappa \leq \lambda$ and λ is infinite. Show that $2^\lambda = \kappa^\lambda$.

5. State and prove Konig's Lemma. (Hint: trees.)

6. Show that for any notion of forcing $\mathcal{P}$ and any countable set $\mathcal{D}$ of $\mathcal{P}$-dense sets, there exists a $\mathcal{D}$-generic $\mathcal{P}$-filter.

Section 3

7. Sketch a proof of Godel's incompleteness Theorem for Arithmetic.

8.Define many-one and truth-table reducibility and show that one imnplies the other but the converse does not hold in general.

9. State the Friedburg-Muchnik Theorem and sketch the proof. Explain how the "priority" argument deals with "injury".