PRINT NAME: ____________________________________

LGIC 010 & PHIL 005
Practice Examination I
Spring Term, 2012

1. (20 points) For each of the following truth-functional schemata, indicate in the space provided whether it is valid, satisfibale but not valid, or unsatisfiable.

   (a) $((p \oplus q) \equiv (p \equiv q))$ _______________

   (b) $((p \oplus q) \equiv (p \vee q))$ _______________

2. (20 points) For each of the following pairs of truth-functional schemata, write "YES" in the space provided, if the first schema of the pair implies the second, and write "NO," if the first schema does not imply the second.

   (a) $(p \oplus q)$ $\quad$ $(p \supset q)$ _______________

   (b) $\neg(p \supset q)$ $\quad$ $(p \oplus r) \oplus (q \oplus r)$ _______________

3. (40 points) Answer each of the following questions.

   (a) How long a list of truth-functional schemata involving only the sentence letters "p," "q," and "r" can you write down so that each schema on your list implies the next schema on your list, but is not implied by it?

   (b) How long a list of truth-functional schemata involving only the sentence letters "p," "q," and "r" can you write down so that each schema on your list implies the next schema on your list, but is not implied by it, and each schema on your list implies "$p \vee (q \wedge r)$"?

   (c) How many truth assignments to the sentence letters "p," "q," "r," and "s" satisfy the schema "$((p \equiv q) \vee r) \oplus s$"?

   (d) How long a list of truth-functional schemata involving only the sentence letters "p," "q," and "r" can you write down so that no two schemata on your list are equivalent and every schema on your list neither implies, nor is implied by, "$((p \oplus q) \oplus r)$"?

4. (20 points) Answer each of the following questions.

   (a) How many structures with universe of discourse $\{1, 2, 3, 4, 5\}$ interpeting only the monadic predicate letter "F" satisfy the following schema?

$$(\exists x)Fx$$

   (b) How many structures with universe of discourse $\{1, 2, 3, 4, 5\}$ interpeting only the monadic predicate letters "F," "G," and "H" satisfy the following schema?

$$\neg(\forall x)(Fx \equiv Gx) \wedge \neg(\forall x)(Fx \equiv Hx) \wedge \neg(\forall x)(Hx \equiv Gx)$$