PRINT NAME:

LGIC 010 & PHIL 005
Practice Examination II
Spring Term, 2016

1. (13 points) Let S and T be pure monadic schemata containing occurrences of only the predicate letters F and G, and suppose that both S and T have power 1,024. What is the maximum possible value of $|\mathsf{mod}(S, 4) \triangle \mathsf{mod}(T, 4)|$?

2. (13 points) What is the longest succinct list of pure monadic schemata containing occurrences of only the predicate letters F and G such that for every pair of schemata S and T on the list $|\mathsf{mod}(S, 4)| = |\mathsf{mod}(T, 4)|$?

3. Let S_1 be $(\forall x)(\exists y)(\forall z)(Lxz \equiv y = z) \wedge (\forall x)(\forall y)(\forall z)((Lxz \wedge Lyz) \supset x = y) \wedge (\forall x)(\forall y)(Lxy \supset (Fx \equiv \neg Fy))$.

   (a) (12 points) Specify a structure A_1 which is a member of $\mathsf{mod}(S_1, 6)$.

   $U^{A_1} =$

   $L^{A_1} =$

   $F^{A_1} =$

   (b) (12 points) How many structures are members of $\mathsf{mod}(S_1, 6)$?

4. Let S_2 be $(\forall x)(\exists y)Lxy$.

   (a) (12 points) Specify a structure A_2 which is a member of $\mathsf{mod}(S_2, 4)$.

   $U^{A_2} =$

   $L^{A_2} =$

(b) (12 points) How many structures are members of $\mathsf{mod}(S_2, 4)$?

5. (13 points) Write down a schema S involving only the triadic predicate letter "H," the monadic predicate letter "F," and the identity predicate such that

- $\mathsf{Spec}(S) = \{n! \mid n \in \mathbb{Z}^+\}$, and
- S implies

$$(\forall x)(\forall y)(\forall z)(Hxyz \supset (Fy \land Fz)) \land (\forall x)(\forall y)(Fy \supset (\exists z)(\forall w)(Hxyw \equiv w = z)).$$

6. (13 points) Let T be the conjunction of the following schemata.

- $(\forall x)\neg Lxx$
- $(\forall x)(\forall y)(Lxy \supset Lyx)$
- $(\forall x)(\exists y)(\exists z)(\forall w)(Lxw \supset (w = y \lor w = z))$
- $(\forall x)(\exists y)(\exists z)(Lxy \land Lxz \land Lyz)$

Specify the spectrum of T.

$\mathsf{Spec}(T) =$