

PRINT NAME:

LGIC 010 & PHIL 005
Practice Examination II
Spring Term, 2017

1. (13 points) Let S be a pure monadic schema containing occurrences of only the predicate letters F and G , and suppose that S has power 2^{12} . What is the maximum possible value of $|\mathbf{mod}(S, 4)|$?
2. (13 points) What is the length of the longest succinct list of pure monadic schemata containing occurrences of only the predicate letters F and G such that for every schema S on the list, $|\mathbf{mod}(S, 4)| = 16$?
3. Let S_1 be $(\forall x)\neg Lxx \wedge (\forall x)(\forall y)(Lxy \supset Lyx) \wedge (\forall x)(\exists y)(\exists z)(y \neq z \wedge (\forall w)(Lxw \equiv (w = y \vee w = z)))$.

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

$$U^{A_1} =$$

$$L^{A_1} =$$

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

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

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

$$U^{A_2} =$$

$$L^{A_2} =$$

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

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

- $\text{Spec}(S) = \{n^2 \mid n \in \mathbb{Z}^+\}$, and
- S implies

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

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

- $(\forall x)(\forall y)(Lxy \supset (Fx \wedge \neg Fy))$
- $(\forall x)(Fx \supset (\exists y)(\forall z)(Lxz \equiv y = z))$
- $(\forall x)(\neg Fx \supset (\exists y)(\forall z)(Lzx \equiv y = z))$

Specify the spectrum of T .

$$\text{Spec}(T) =$$