

Exercises for Semantics of Quantifiers

January 22, 2009

Due in class: January 27, 2009

For all exercises, **use the formal semantics for predicate logic as presented in the class slides**. Determine the truth-value of the following sentences in the interpretation, using general knowledge. In each case explain your answer.

Interpretation 1, for Exercises 1 and 2

Domain: All U.S citizens over the age of 21 with a social security number

Names: Each person in the domain is named by 'a' subscripted by his or her social security number

Predicates: Mx: x is a millionaire. Hx: x is happy.

Exercise 1 (Teller 2-5 a5)

$$(\forall x)[(Mx \supset Hx) \ \& \ (\sim Mx \supset \sim Hx)]$$

Exercise 2 (Teller 2-5 a7)

$$(\exists x)(Mx \ \& \ Hx) \ \& \ (\exists x)(Mx \ \& \ \sim Hx)$$

Interpretation 2, for Exercises 3-5

Domain: All integers, 1, 2, 3, 4, ...

Names: Each integer is named by 'a' subscripted by that integer's numeral

Predicates: Ox: x is odd. Hx: Kxy x is greater than or equal to y.

Exercise 3 (Teller 2-5 b4)

$$(\forall x)Kxa_{17}$$

Exercise 4 (Teller 2-5 b5)

$$(\forall x)(Ox \ \vee \ \sim Ox)$$

Exercise 5 (Teller 2-5 b9)

$$(\forall x)(Ox \supset Kxa_{17}) \ \& \ (\forall x)(\sim Ox \supset \sim Kxa_{17})$$