

Homework 5, Philosophy 112

February 12, 2009

Due in class: February 17, 2009

1 Substitution Instances

Provide the substitution instance using 'a' for each of the following sentences.

- a. $(\forall x)(\forall y)(F_{xy} \supset (\exists x)G_{yx})$
- b. $(\exists x)Fg(x)x$
- c. $(\forall y)(\forall z)(a = y \vee a = z \vee x = z)$

2 Logical Equivalence

Using the formal semantics, show that the sentence ' $\sim(\forall x)\sim Fx$ ' is logically equivalent to the sentence ' $(\exists x)Fx$.'

3 Restricted Quantifiers

Using the following transcription guide, transcribe the following sentences twice, first by using unrestricted quantifiers, then by using restricted quantifiers.

Transcription Guide

$D = \{x: x \text{ is a positive integer}\}$

s : the successor function

Gxy : x is greater than y ; Ex : x is even

- a. All even positive integers are greater than at least one positive integer.
- b. No positive integer that is not even is less than every other positive integer.

4 Transcribing from English into Logic

Using the transcription guide above, and without using subscripts for restricted quantifiers, transcribe the following sentences into predicate logic. Note any ambiguous sentences, and provide alternative transcriptions.

- a. Some positive integer is not greater than any positive integer.
- b. If a positive integer is odd, then it has a successor that is even.
- c. All the positive integers are not greater than their successors.