

Homework: Function symbols and definite descriptions

Part A: symbolizations.

Symbolize each of the following, using predicate logic with identity, function symbols, and the ι operator. (Do *not* eliminate descriptions using Russell's method.)

1. If a man marries his mother, he kills his father.
2. Only a time traveler introduces her parents to each other.
3. The product of an even number and an odd number is an even number.
4. If the square of a number that is divisible by each smaller number is odd, then that number is greater than all numbers.
5. The black cat bit the brown dog.
6. If a person commits a crime, then the judge that sentences him/her wears a wig.
7. The tallest spy is a spy.

For the next problem, first symbolize with the ι operator. Then symbolize *two* readings of the sentence using Russell's method. Explain the intuitive difference between those two readings, and explain which is most similar to the ι symbolization.

8. The ten-foot-tall man is not happy.

Part B: semantics

9. Show that $\models \forall x Fx \rightarrow Ff(a)$
10. Assume the following semantics for the ι operator: empty descriptions denote the "nil" object; and the nil object is never in the extension of any predicate. Show that $\models \forall x L(x, \iota y Fxy) \rightarrow \forall x \exists y Lxy$
11. Show that $\{ \forall x f(x) \neq x \} \not\models \exists x \exists y (f(x)=y \ \& \ f(y)=x)$
12. Assuming the same semantics as in problem 10, show that $\not\models G \iota x Fx \rightarrow F \iota x Gx$