LIS 561 Assignment 7: Predicate Logic

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Exercise 4.8

Assume the domain of discourse to be all human beings. Translate the following sentences into predicate logic:

(1) Augustus is not loved by everyone. (Use a for Augustus, L for love.)

(2) Augustus and Livia respect each other. (Use a for Augustus, l for Livia and R for respect.)

(3) Livia respects everyone who loves Augustus.

Answers:

1) $\neg\forall x(Lxa)$

2) $(Ral \wedge Rla)$

3) $\forall x(Rlx \leftrightarrow Lxa)$

Exercise 4.10

For each of the following, specify an appropriate domain of discourse, specify a key, and translate into predicate logic. (Note: you have to understand what a sentence means before you can attempt to translate it.)

(1) Dogs that bark do not bite.

(2) All that glitters is not gold.

(3) Friends of Michelle's friends are her friends.

(4) There is a least natural number.

(5) There is no largest prime number

Answers:

1) $Kd \rightarrow \neg Td$ [$K\ for\ bark, T\ for\ bite, d\ for\ dog$]

2) $\forall x(Lx \rightarrow \neg Gx)$[$domain\ of\ discourse: all\ things, L\ for\ glitter, G\ for\ be\ gold$]

3) $\forall x\forall y((Fxm \wedge Fyx) \rightarrow Fym)$[$domain\ of\ discourse: all\ people, Ffor\ be\ friend$]

4) $(\exists x \in N)(\forall y \in N)(x < y)$[$domain\ of\ discourse: all\ numbers$]

5) $(\forall x \in P)(\exists y \in P)(x < y)$[$domain\ of\ discourse: all\ numbers$]