PHIL 103: Logic and Reasoning QRII

Practice #5

Translate each of the following three sentences into our formal language. Represent as much of the internal structure of the sentences as possible.

1. Sally only dates men who are shorter than she is.

2. If everything is bigger than something, then nothing is smaller than everything.

3. Unless everyone studies hard, someone will be disappointed.

4. In Section 3.2, I asked how you might translate the sentence, "Nothing is better than cake." You might follow the example in the text and try ~(∃x)Bxc, where B = "… is better than ---" and c = cake. But there is something seriously wrong with this translation. What? [Hint: Is "cake" the name of a concrete individual?]

5. The sentence in Problem 4 is deceptively simple looking. It is really quite difficult to translate. Try to give a better translation of the sentence than the one suggested above. Then discuss some difficulties for translation that are raised by the sentence. [Hint: Does the sentence say that nothing is better than *anything* that is cake?]

6. Consider the two-place relation, "Hikaru prefers … to --- for breakfast." Hikaru prefers waffles to pancakes. He prefers sausages to waffles. He also prefers sausages to pancakes, and he prefers eggs to everything. Say that Hikaru's breakfast preferences are transitive if and only if the relation, "Hikaru prefers … to --- for breakfast," is transitive. Are Hikaru's breakfast preferences transitive?

7. Consider the game of rock, paper, scissors. The game involves the relation, "… beats ---." First draw a directed graph representing the relation in rock, paper, scissors. Then describe as many of the properties of the relation as you can: e.g. is it transitive? symmetric? reflexive?

8. Describe a small world that is a model for the sentences (∀x)(Ax → Bx) and (∃x)(Ax ∧ Bx).

9. Describe a small world showing that the inference below is *not* valid.

$$\{ (\forall x)(\exists y)Lxy \} \vDash (\exists x)(\forall y)Lxy$$