Practice Second Exam
Phi 321 Formal Logic
Fall 2015, Jared Bates

Part 1. Translations. Translate the following sentences into PLE using the symbolization guides provided. (10 pts each)

1. Achilles has an immortal parent. (Ix: x is an immortal. Pxy: x is a parent of y. a: Achilles)

2. Penelope loathes all of the suitors who brutalize a beggar. (Lxy: x loathes y. Bxy: x brutalizes y. Sx: x is a suitor. Ex: x is a beggar. p: Penelope)

3. At least two Myrmidons die in battle, and at least one of them was fleet of foot. (Mx: x is a Myrmidon. Dx: x dies in battle. Fx: x is fleet of foot.)

4. The father of Telemachus is married to a daughter of Icarius. (Fxy: x is a father of y. Mxy: x is married to y. Dxy: x is a daughter of y. t: Telemachus. i: Icarius)

Part 2. Interpretations. Construct interpretations to solve the following problems. Use interpretations with small, numerical domains, and verify your interpretations with full semantic trees. (10 pts each)

5. Show that the following sentence is not quantificationally true.
   (∃x)(Rx & Hx) ≡ ((∃x)Rx & (∃x)Hx)

6. Show that the following sentences are quantificationally consistent.
   (∀x)((Gx & x≠r) ⊃ Lxx). (∀x)(~Gx ≡ x=r). (∃x)Lrx

7. Show that the following sentences are not quantificationally equivalent.
   (∀x)(∃y)(Kxy ⊃ Mcx). (∀x)((∃y)Kxy ⊃ Mcx)

8. Show that the following argument is quantificationally invalid.
   (∃x)((∀y)(Py ≡ y=x) & (Cx v Bx)). ~(∃z)~(Pz & Cz). ∴ (∃x)~Bx

Part 3. Combination. Translate the following argument into PLE using the symbolization guide provided. Then prove that your translation is *quantificationally invalid*. Provide an interpretation with a small, numerical domain, and verify your interpretation with full semantic trees. (20 pts)

9. Every person loves at least two people. Therefore, there are at least three people. (Lxy: x loves y. Px: x is a person.)