EXAM 4 (U17-18)

ANSWER ALL QUESTIONS ON THIS EXAM. This exam is worth a total of 100 points. The points for each section & question are noted in parenthesis.

Part A. Symbolize the following sentences, using the given abbreviations. (Universe = People) (40 points total)

a ≡ Anne
b ≡ Bob
Mxy ≡ x is the mother of y
Lxy ≡ x loves y
Txy ≡ x is taller than y
Rxy ≡ x respects y
Oxy ≡ x is older than y

Sx ≡ x is a student
Px ≡ x is a professor
Wx ≡ x is a woman
Nx ≡ x is a man

1. Anne loves Bob, but Bob doesn't love Anne. (8)

2. Someone respects Bob. (8)

3. Everybody loves somebody (or other). (8)

4. Every professor loves some student (or other). (8)

5. Not everyone respects some person (or other). (8)

Part B. Translate the following formulas into English; use the abbreviations given above. (Universe = People) (20 points total)

7. (∃x) Max ∨ ~ (∃y) Lya (5)

8. (∃y) (x) Txy (5)

9. $\sim(\exists x)\,(Sx \bullet (y)\,(Py \supset Oxy))$ (5)

10. $(x)\,Rxx \bullet (\exists y)\,Lyy$ (5)

Part C. (40 points total)

11. Use the model universe method to show that the following argument is invalid. (12)
$(x)\,(Fx \supset (y)\,Gxy) \;\; / \therefore \;\; (\exists x)\,(Fx \bullet (\exists y)\,Gxy)$

12. Give a proof for the following argument. (14)

(x) (Bx ⊃ Px), (x) [Ax ⊃ (∃y) (By • Rxy)] /∴ (x) [Ax ⊃ (∃y) (Py • Rxy)]

13. Prove the following theorem. (14)
(x) (y) Fxy ⊃ ~ (∃x) (y) ~Fxy