Philosophy 240: Symbolic Logic Fall 2009

Relational Predicates Translation I Handout

I. Prove:

- 1. Bob is taller than Charles.
- 2. Andrew is taller than Bob.
- 3. For any x, y and z, if x is taller than y and y is taller than z, then x is taller than z. Therefore, Andrew is taller than Charles.

II. Formation rules for wffs of **F**

1. An n-place predicate followed by n constants or variables is a wff.

2. If α is a wff, so are

 $(\exists x)\alpha, (\exists y)\alpha, (\exists z)\alpha, (\exists w)\alpha, (\exists v)\alpha$ (x) $\alpha, (y)\alpha, (z)\alpha, (w)\alpha, (v)\alpha$

3. If α is a wff, so is $\sim \alpha$.

4. If α and β are wffs, then so are:

- (α · β)
 (α ∨ β)
 (α ⊃ β)
 (α = β)
 By convention, you may drop the outermost brackets.
 5. These are the only ways to make wffs.
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- III. Translate each
 - 1. John loves Mary. (Lxy: x loves y)
 - 2. Tokyo isn't smaller than New York. (Sxy: x is smaller than y)
 - 3. Marco was introduced to Erika by Paco. (Ixyz: x introduced y to z)
 - 4. America took California from Mexico. (Txyz: x was taken by y from z)

IV. Introducing quantifiers

- 1. Joe is bigger than something. (Bxy: x is bigger than y)
- 2. Something is bigger than Joe.
- 3. Joe is bigger than everything.
- 4. Everything is bigger than Joe.
- 5. Everything loves something. (Lxy: x loves y)
- 6. Something loves everything.

V. More complex examples

- 1. Something taught Plato. (Txy: x taught y)
- 2. Someone taught Plato.
- 3. Plato taught everyone.
- 4. Everyone knows something. (Kxy: x knows y)
- 5. Jen reads all books written by Asimov. (Bx: x is a book; Wxy: x writes y; Rxy: x reads y; j: Jen; a: Asimov)
- 6. Some people read all books written by Asimov.
- 7. Some people read all books written by some one.
- 8. Honest candidates are always defeated by dishonest candidates. (Hx, Cx, Dxy: x defeats y)
- 9. No mouse is mightier than himself. (Mx, Mxy: x is mightier than y)
- 10. Everyone buys something from some store. (Px, Sx, Bxyz: x buys y from z)
- 11. No store has everyone for a customer.
- VI. Translate each of the following into predicate logic, using relational predicates.
 - 1. Everyone is wiser than someone. (Wxy: x is wiser than y)
 - 2. Someone is wiser than everyone.
 - 3. Some financier is richer than everyone. (Fx, Rxy: x is richer than y)
 - 4. No deity is weaker than some human. (Dx, Hx, Wxy: x is weaker than y)
 - 5. There is a store from which everyone buys something. (Px, Sx, Bxyz: x buys y from z)