Philosophy 240: Symbolic Logic
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Solutions to Homework Handout #7: Second-Order Logic

1. Jared has some properties, but he lacks some properties.
   $(\exists X)Xj \bullet (\exists X)\sim Xj$

2. Mike and Nick share no attributes.
   $(X)(Xm \equiv \sim Xn)$

3. Some attributes are properties of nothing.
   $(\exists X)(x)\sim Xx$

4. Everyone shares some property with Tudor.
   $(x)[Px \supset (\exists X)(Xt \bullet Xx)]$

5. Gillian shares some attributes with a famous scientist.
   $(\exists x)[(Fx \bullet Sx) \bullet (\exists X)(Xg \bullet Xx)]$

6. All philosophers and scientists have properties in common.
   $(x)\{Px \supset [(y)Sy \supset (\exists X)(Xx \bullet Xy)]\} \bullet (x)\{Sx \supset [(y)Py \supset (\exists X)(Xx \bullet Xy)]\}$

7. Reva has at least two different properties.
   $(\exists X)(\exists Y)[Xr \bullet Yr \bullet (\exists x)\sim(Xx \equiv Yx)]$

8. Ron has all of his father's properties.
   $(X)(Xf(r) \supset Xr)$

9. Some relations are both reflexive and symmetric.
   $(\exists X)[(x)Xxx \bullet (x)(y)(Xxy \supset Xyx)]$

10. There is something which lacks all transitive relations.
    $(\exists x)(X)\{(x)(y)(z)[(Xxy \bullet Xyz) \supset Xxz] \supset \sim Xx\}$