Supply semantic proofs for all of the following.

1. “(∀x(F(x) → G(x)) → ∃x(F(x) ∧ G(x)))” is contingent.
2. “(F(a) ∧ ∀x(F(x) → G(x)) ∧ ¬G(a)” is L-false.
3. “(F(a) ∧ (a = b)) → F(b)” is L-true.
4. “((F(a) ∧ (a = b)) ∧ (b = c)) → F(c)” is L-true.
5. “(((a = b) ∧ (b = c) ∧ (c = d))) → (a = d)” is L-true.
6. “∀x(H(x,a) → K(a,x)) → (H(b,a) → K(a,b))” is L-true.

7. { ∀x∃yR(x,y) } |≠ ∃y∀xR(x,y) [show entailment]
8. { (F(a) ∧ ∀x(F(x) → G(x)) } |= G(a)
9. { (F(a) v F(b)), ∀x(F(x) → G(x)) } |= (G(a) v G(b))
10. { ∀x(F(x) → G(x)), ∀y(G(y) → H(y)), F(a) } |= (H(a) v H(b))

11. { ∀x(F(x) → G(x)), ∀x∀y(G(y) → ¬F(y)) } is consistent.
12. { ∀x∃yR(x,y), ∃y∀xR(x,y) } is consistent.
13. { R(a,b), R(b,a), ∀x∀y (R(x,y) → (R(x,x) ∧ R(y,y)), ¬R(a,a) } is inconsistent.
14. { F(a), F(b), F(c), ∀x(F(x) → ((x = a) v (x = b))), (c ≠ a), (b ≠ c) } is inconsistent.

15. “¬∀x∃y¬G(x,y)” is semantically inequivalent to “∀x∃yG(x,y)”
16. “∀x(F(x) → G(x))” is semantically equivalent to “∀y(¬G(y) → ¬F(y))”
17. “∀x(a = x)” is semantically equivalent to “∀z(z = a)”

Assignment #4 (Due via email on Tuesday, March 15) #4, #9, #14, and #16.