

Practice: QL and QL⁼Universe of Discourse **D** = persons; Lexicon:

a = Locke

F = is a philosopher

L = ... likes ...

b = Berkeley

G = is empiricist

K = ... knows ...

c = Hume

H = is an atheist

R = ... prefers ... to ...

1. Every philosopher who knows Locke likes him.

$$\forall x((Fx \ \& \ Kxa) \supset Lxa)$$

2. There is an empiricist philosopher who is not an atheist.

$$\exists x(Fx \ \& \ Gx \ \& \ \sim Hx)$$

3. Every empiricist philosopher likes Locke.

$$\forall x((Fx \ \& \ Gx) \supset Lxa)$$

4. There is nobody who does not prefer Hume to Berkeley.

$$\sim \exists x(\sim Rxcb)$$

5. Every atheist who knows Hume is not liked by Berkeley and Locke.

$$\forall x(Hx \ \& \ Kxc) \supset (\sim Lbx \ \& \ \sim Lax) \text{ or } \forall x(Hx \ \& \ Kxc) \supset \sim(Lbx \vee Lax)$$

6. $\forall x((Fx \ \& \ Rxba) \supset Lcx)$

Every philosopher who prefers Berkeley to Locke is liked by Hume.

7. $\exists x \forall y(Fx \ \& \ (Hx \vee Kxc) \ \& \ Rxyb)$

There is an empiricist philosopher who is either an atheist or knows Hume and prefers anyone to Berkeley.

8. $\exists x(Fx \ \& \ \forall y(Hy \supset Lxy))$

Some philosopher loves every atheist.

9. $\sim \exists x(Gx \ \& \ \exists y(Hy \ \& \ Lxy)) \supset \forall z((Fx \ \& \ \sim Kxa) \supset Rzbc)$

If there is no empiricist who likes any atheist, then all philosophers who do not know Locke prefer Berkeley to Hume.

10. $\sim \forall x(Fx \ \& \ (\exists yLxy \ \& \ Gy)) \supset \forall z((Hz \ \& \ Lzx) \supset Kxz)$

Not every philosopher who likes an empiricist knows any atheist who likes him/her.

11. Only Hume prefers Locke to Berkeley.
 $Rhab \ \& \ \forall x(Rxab \supset x = h) \ \text{or} \ Rhab \ \& \ \forall x(\sim x = h \supset \sim Rxab)$
12. Everybody except Locke knows either Berkeley or Hume.
 $\forall x(Kxb \vee Kxc) \ \& \ \sim(x = a)$
13. Everybody who likes Hume likes no one else.
 $\forall x(Lxc \supset \sim \exists yLxy \ \& \ \sim(x = c))$
14. Hume is the only empirist and atheist philosopher.
 $Fc \ \& \ Gc \ \& \ Hc \ \& \ \forall x((Fx \ \& \ Gx \ \& \ Hx) \supset x = c)$
15. The most known philosopher is an empiricist.
 $\exists x(((Fx \ \& \ \forall y((Fy \ \& \ \sim(y = x)) \supset Kyx)) \ \& \ \forall z((Fz \ \& \ \forall y((Fz \ \& \ \sim(z = y)) \supset Kzy)) \supset y = x)) \ \& \ Gx)$
16. $\exists x(Kbx \ \& \ \sim(x = a \ \& \ x = c))$
 Berkeley knows someone but neither Locke nor Hume.
17. $\sim(c = b) \supset \exists x \exists y((Kxa \ \& \ Kya) \ \& \ \sim(x = y))$
 If Hume is not Berkeley, then at least two different persons know Locke.
18. $\forall x(Lxc \supset \sim \exists yLxy \ \& \ \sim(y = c))$
 Everybody only likes Hume.
19. $\exists x((Fx \ \& \ Gx \ \& \ Hx) \ \& \ \forall y(Fy \ \& \ Gy \ \& \ Hy) \supset y = x)$
 Exactly one philosopher is an empirist and an atheist.
20. $\exists x(((Fx \ \& \ Gx) \ \& \ \forall y(Fy \ \& \ Gy) \supset x = y) \ \& \ (Lcx \equiv Hx))$
 Hume likes the empiricist philosopher if only if he is an atheist.
21. $\exists x \exists y \exists z(((Fx \ \& \ Gx) \ \& \ (Fy \ \& \ Gy) \ \& \ (Fz \ \& \ Gz) \ \& \ (\sim(x = y) \ \& \ \sim(x = z) \ \& \ \sim(y = z))) \ \& \ \forall w((Fw \ \& \ Gw) \supset (w = x \vee w = y \vee w = z)))$
 There are exactly three empiricist philosophers.
22. $\exists x \exists y(((Fx \ \& \ Gx) \ \& \ (Fy \ \& \ Hy) \ \& \ \sim(x = y)) \ \& \ Rbxy)$
 Berkeley prefers the empiricist philosopher to the atheist philosopher.
23. If Hume and Berkeley know Locke, two empiricist philosophers know another one.
 $Kcb \ \& \ Kba \supset \exists x \exists y \exists z((Gx \ \& \ Fx) \ \& \ (Gy \ \& \ Fy) \ \& \ \sim(x = y) \ \& \ (Gz \ \& \ Fz) \ \& \ \sim(z = x) \ \& \ \sim(z = y) \ \& \ Kxz \ \& \ Kyz)$

