Quiz #10

PHIL-205-01: Symbolic Logic

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Annotate the following proof.
(Note that because the proof is rather large, it has been moved to the next page to ensure that it fits properly.)

1.	$\exists x \exists y(Fx \wedge Fy \wedge \neg x = y)$	
2.	$\exists x \exists y(Gx \wedge Gy \wedge \neg x = y)$	
3.	$\neg \exists x \exists y(Fx \wedge Gy \wedge \neg x = y)$	
4.	$\forall x \neg \exists y(Fx \wedge Gy \wedge \neg x = y)$	**CQ:** 3
5.	$\forall x \forall y \neg(Fx \wedge Gy \wedge \neg x = y)$	**CQ:** 4
6.	$\exists y(Fa \wedge Fy \wedge \neg a = y)$	
7.	$Fa \wedge Fb \wedge \neg a = b$	
8.	$\exists y(Gc \wedge Gy \wedge \neg c = y)$	
9.	$Gc \wedge Gd \wedge \neg c = d$	
10.	$\forall y \neg(Fa \wedge Gy \wedge \neg a = y)$	$\forall$ **Elim:** 5
11.	$\neg(Fa \wedge Gc \wedge \neg a = c)$	$\forall$ **Elim:** 10
12.	Fa	$\wedge$ **Elim:** 9
13.	Gc	$\wedge$ **Elim:** 9
14.	$Fa \wedge Gc$	$\wedge$ **Intro:** 12, 13
15.	$\neg a = c$	
16.	$Fa \wedge Gc \wedge \neg a = c$	$\wedge$ **Intro:** 14, 15
17.	$\bot$	$\bot$ **Intro:** 11, 16
18.	$\neg \neg a = c$	$\neg$ **Intro:** 15–17
19.	$a = c$	**DNE:** 18
20.	$\forall y \neg(Fb \wedge Gy \wedge \neg b = y)$	$\forall$ **Elim:** 5
21.	$\neg(Fb \wedge Gc \wedge \neg b = c)$	$\forall$ **Elim:** 20
22.	Fb	$\wedge$ **Elim:** 7
23.	Gc	**Reit:** 13
24.	$Fb \wedge Gc$	$\wedge$ **Intro:** 22–23
25.	$\neg b = c$	
26.	$Fb \wedge Gc \wedge \neg b = c$	$\wedge$ **Intro:** 24–25
27.	$\bot$	$\bot$ **Intro:** 21, 26
28.	$\neg \neg b = c$	$\neg$ **Intro:** 25–27
29.	$b = c$	**DNE:** 28
30.	$a = b$	$=$ **Elim:** 19, 29
31.	$\neg a = b$	$\wedge$ **Elim:** 7
32.	$\bot$	$\bot$ **Intro:** 30, 31
33.	$\bot$	$\exists$ **Elim:** 8, 9–32
34.	$\bot$	
35.	$\bot$	$\exists$ **Elim:** 6, 7–34
36.	$\bot$	$\exists$ **Elim:** 3, 6–35
37.	$\neg \neg \exists x \exists y(Fx \wedge Gy \wedge \neg x = y)$	$\neg$ **Intro:** 3–36
38.	$\exists x \exists y(Fx \wedge Gy \wedge \neg x = y)$	**DNE:** 37