Philosophy 225 -- Symbolic Logic
HW 8 Possible Answers

1a)

	{1}	(1)	(x)(∃y)Fxy	P
	{2}	(2)	(x)(y)(Fxy → Gyy)	P
	{3}	(3)	(x)(y)(Fxy → Fyx)	P
i	{1}	(4)	(∃y)Fay	1, UE
j	{5}	(5)	Fa<u>b</u>	P (for EE)
	{3}	(6)	Fab → Fba	3, UE^2
	{2}	(7)	Fba → Gaa	2, UE^2
k	{2,3,5}	(8)	Gaa	5,6,7, T
	{1,2,3}	(9)	Gaa	4,5,8, EE
	{1,2,3}	(10)	(x)Gxx	9, UI

** Note that you must do EE before doing UI.

1b)

i	{1}	(1)	(∃x)(y)Fxy	P
j	{2}	(2)	(y)F<u>a</u>y	P (for EE)
	{2}	(3)	Fab	2 UE
	{2}	(4)	(∃x)Fxb	3 EI
k	{2}	(5)	(y)(∃x)Fxy	4 UI
	{1}	(6)	(y)(∃x)Fxy	1,2,5 EE

2a) IS a consequence:

	{1}	(1)	(x)(y)(Fxy → Gy)	P
	{2}	(2)	(x)(Gx → –Hxx)	P
i	{3}	(3)	(∃x)Hxx	P
j	{4}	(4)	H<u>a</u>a	P (for EE)
	{2}	(5)	Ga → –Haa	2, UE
	{1}	(6)	Fba → Ga	1, UE^2
	{1,2,4}	(7)	–Fba	4,5,6, T
	{1,2,4}	(8)	(y)–Fya	7, UI
k	{1,2,4}	(9)	(∃x)(y) –Fyx	8, EI
	{1,2,3}	(10)	(∃x)(y) –Fyx	3,4,9 EE

2b) is NOT a consequence:

D = {0}
F: Λ
G: Λ
H: {<0,0>}

3)		{1}	(1)	(y)(∃x)Fxy	P
	i	{1}	(2)	(∃x)Fxa	1 UE
	j	{3}	(3)	F<u>b</u>a	P (for EE)

Now we have to use UI to generalize on 'a' in line 3. That is, we would like to do this:

	{3}	(4)	(y)Fby	3 UI

But the constant we are generalizing on, namely 'a', appears in the premise of line (3), namely premise {3}. Hence we cannot use UI. In this case there is no way around the problem: by soundness, the conclusion cannot be derived from the premise, since it is not a consequence of it. We see again that our rules are safe (i.e., sound) since they block an inference that would lead us to a bad conclusion.

4a)		{1}	(1)	P → – (S ∧ –T)	P
		{2}	(2)	–P → –S	P
	–S	{3}	(3)	–T	P
		{4}	(4)	S	P (for RAA)
		{2,4}	(5)	P	2,4 TH (Contra)
		{1,2,4}	(6)	– (S ∧ –T)	1,5 MP
		{1,2,4}	(7)	–S ∨ – –T	6 R (Contra)
		{1,2,3,4)	(8)	–S	3,7 DE
		{1,2,3,4}	(9)	S ∧ –S	4,8 CE
		{1,2,3}	(10)	–S	4,9 RAA

4b)		{1}	(1)	–[R ∨ (–S → –T)]	P
	–Q	{2}	(2)	–[(R → S) → – (–R → –Q)]	P
		{1}	(3)	–R ∧ – (–S → –T)	1 R (DeM)
		{2}	(4)	(R → S) ∧ – – (–R → –Q)	2 R (DeM)
		{2}	(5)	– – (–R → –Q)	4 CE
		{2}	(6)	–R → –Q	5 R (DN)
		{1}	(7)	–R	3 CE
		{1,2}	(8)	–Q	6,7 MP