Phi 270 F03 test 4

Analyze the sentences below in as much detail as possible, providing a key to the non-logical vocabulary you use. *Restate 2 using an unrestricted quantifier*.

1. No one called the new number
   answer

2. Sam asked everyone he could think of [Remember to restate this one using an unrestricted quantifier.]
   answer

3. If any door was opened, the alarm sounded
   answer

4. Only people who'd read everything the author had written were asked to review the book
   answer

Use derivations to show that the following arguments are valid. You may use any rules.

5. ∀x (Fx ∧ Gx)
    _____

      ∀x Gx
    answer

6.   ∀x (Fx → Gx)
    ∀x ∀y (Gy → Rxy)
    _____

      ∀x ∀y (Fy → Rxy)
    answer

Use a derivation to show that the following argument is not valid and describe a structure (by using either a diagram or tables) that divides an open gap.
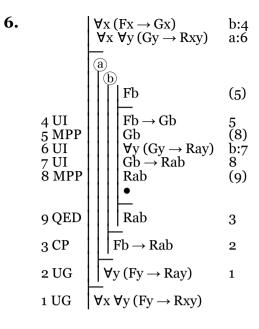
7.   ∀x (Fx → Rxa)
    _____
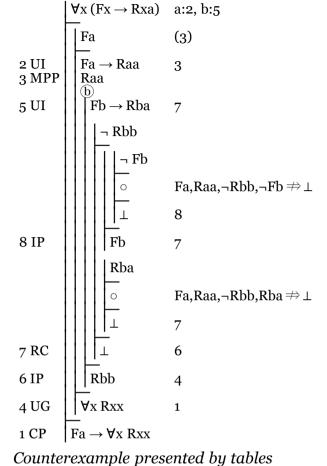
      Fa → ∀x Rxx
    answer

Phi 270 F03 test 4 answers

1. No one called the new number
   No one is such that (he or she called the new number)
   (∀x: x is a person) ¬ x called the new number)
                    (∀x: Px) ¬ Cxn
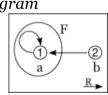   C: [_ called _]; P: [_ is a person]; n: the new number

2. Sam asked everyone he could think of

everyone Sam could think of is such that (Sam asked him or her)

(∀x: x is a person Sam could think of) Sam asked x

(∀x: x is a person ∧ Sam could think of x) Asx

(∀x: Px ∧ Tsx) Asx

∀x ((Px ∧ Tsx) → Asx)

A: [_ asked _]; P: [_ is a person]; T: [_ could think of _]; s: Sam

3. If any door was opened, the alarm sounded

every door is such that (if it was opened, the alarm sounded)

(∀x: x is a door) if x was opened, the alarm sounded

(∀x: Dx) (x was opened → the alarm sounded)

(∀x: Dx) (Ox → Sa)

D: [_ is a door]; O: [_ was opened]; S: [_ sounded]; a: the alarm

4. Only people who'd read everything the author had written were asked to review the book

Only people who'd read everything the author had written are such that (they were asked to review the book)

(∀x: ¬ x is a person who'd read everything the author had written) ¬ x was asked to review the book

(∀x: ¬ (x is a person ∧ x had read everything the author had written)) ¬ Axb

(∀x: ¬ (x is a person ∧ everything the author had written is such that (x had read it))) ¬ Axb

(∀x: ¬ (Px ∧ (∀y: y is a thing the author had written) x had read y)) ¬ Axb

(∀x: ¬ (Px ∧ (∀y: the author had written y) Rxy)) ¬ Axb

(∀x: ¬ (Px ∧ (∀y: Way) Rxy)) ¬ Axb

A: [_ was asked to review _]; P: [_ is a person]; R: [_ had read _]; R: [_ had written _]; a: the author; b: the book

5.

	∀x (Fx ∧ Gx)	a: 2
	(a)		
2 UI	Fa ∧ Ga	3
3 Ext	Fa	
3 Ext	Ga	(4)
	•	
4 QED	Ga	1
1 UG	∀x Gx	

6.

$$\forall x\,(Fx \to Gx) \qquad b{:}4$$
$$\forall x\,\forall y\,(Gy \to Rxy) \qquad a{:}6$$

ⓐ
　　ⓑ

	Fb	(5)

4 UI	Fb → Gb	5
5 MPP	Gb	(8)
6 UI	∀y (Gy → Ray)	b:7
7 UI	Gb → Rab	8
8 MPP	Rab	(9)
	•	

9 QED	Rab	3
3 CP	Fb → Rab	2
2 UG	∀y (Fy → Ray)	1
1 UG	∀x ∀y (Fy → Rxy)	

7.

	$\forall x\,(Fx \rightarrow Rxa)$	a:2, b:5
	Fa	(3)
2 UI	Fa → Raa	3
3 MPP	Raa	
	ⓑ	
5 UI	Fb → Rba	7
	¬ Rbb	
	¬ Fb	
	○	Fa,Raa,¬Rbb,¬Fb $\not\Rightarrow \bot$
	⊥	8
8 IP	Fb	7
	Rba	
	○	Fa,Raa,¬Rbb,Rba $\not\Rightarrow \bot$
	⊥	7
7 RC	⊥	6
6 IP	Rbb	4
4 UG	$\forall x\,Rxx$	1
1 CP	Fa → $\forall x\,Rxx$	

Counterexample presented by tables

Counterexample presented by a diagram

range: 1, 2

a b		τ	Fτ		R	1	2
1 2		1	T		1	T	F
		2	F		2	T	F

(This interpretation divides both gaps; the value of F2 is needed only for the 1st and the value of R21 only for the 2nd.)