Phi 270 F97 test 5

(questions from the last of 6 quizzes)

Analyze the following sentences in as much detail as possible, providing a key to the non-logical vocabulary (upper and lower case letters) appearing in your answer.

1. Tom phoned someone who had left a message for him. [Give this analysis also using an unrestricted quantifier.]
   answer
2. Santa said something to each child. [This sentence is ambiguous. Analyze it in two different ways, and describe a situation in which the sentence is true on one of your interpretations and false on the other.]
   answer
3. Ron asked Santa for at least two things.
   answer
4. Analyze the sentence below using each of the two ways of analyzing definite descriptions. That is, analyze it using Russell's analysis of definite descriptions as quantifier phrases and then analyze it again using the description operator.

   Bill lent the book Ann gave him to Carol

   answer
5. Use derivations to show that the following argument is valid. You may use any rules.

   $\exists x\, \exists y\, (Rxy \wedge Sxy)$

   $\exists y\, \exists x\, (Sxy \wedge Rxy)$

   answer
6. Use a derivation to show that the following argument is not valid and describe a structure dividing an open gap.

   $\exists x\, Rax$

   $\exists x\, Rxa$

   answer
7. Complete the following to give a definition of inconsistency in terms of truth values and possible worlds:

   A set Γ is inconsistent if and only if …

   answer

8. Describe a structure (i.e., an assignment of extensions to the non-logical vocabulary) which makes the list of 5 sentences below all true and use it to calculate a truth value for the sentence that follows them. (You may present the structure using either tables or a diagram.)

make these true: b = ga, fa = f(ga), Rab, R(fa)a, ¬ R(fb)b

calculate the value: (b = gb ∨ Ra(ga)) → (R(fa)(ga) ∧ f(gb) = g(fb))

answer

9. Give two different restatements of the sentence below in expanded form as a complex predicate (i.e., an abstract) applied to a term.

∃y Rayb

answer

Phi 270 F97 test 5 answers

1. Tom phoned someone who had left a message for him

someone who had left a message for Tom is such that (Tom phoned him or her)

(∃x: x is a person who had left a message for Tom) Tom phoned x

(∃x: x is a person ∧ x had left a message for Tom) Htx

(∃x: Px ∧ some message is such (x had left it for Tom)) Htx

(∃x: Px ∧ (∃y: y is a message) x had left y for Tom) Htx

(∃x: Px ∧ (∃y: My) Lxyt) Htx

∃x ((Px ∧ ∃y (My ∧ Lxyt)) ∧ Htx)

H: [_ phoned _]; L: [_ had left _ for _]; M: [_ is a message];
P: [_ is a person]; t: Tom

2. *first analysis:*

each child is such that (Santa said something to him or her)

(∀x: x is a child) Santa said something to x

(∀x: Cx) something is such that (Santa said it to x)

(∀x: Cx) ∃y Santa said y to x

(∀x: Cx) ∃y Dsyx

second analysis:

something is such that (Santa said it to each child)

∃x Santa said x to each child

∃x each child is such that (Santa said x to him or her)

∃x (∀y: y is a child) Santa said x to y

∃x (∀y: Cy) Dsxy

C: [_ is a child]; D: [_ said _ to _]; s: Santa

The first is true and the second false if Santa spoke to each child but said different things to different children

3. Ron asked Santa for at least two things

∃x (∃y: ¬ y = x) (Ron asked Santa for x ∧ Ron asked Santa for y)

$$\exists x\,(\exists\, y{:}\ \neg\, y = x)\ (Arsx \land Arsy)$$

A: [_ asked _ for _]; r: Ron; s: Santa

4. *using Russell's analysis:*

Bill lent the book Ann gave him to Carol

the book Ann gave Bill is such that (Bill lent it to Carol)

(∃x: x and only x is a book Ann gave Bill) Bill lent x to Carol

(∃x: x is a book Ann gave Bill ∧ (∀y: ¬ y = x) ¬ y is a book Ann gave Bill) Lbxc

(∃x: (x is a book ∧ Ann gave Bill x) ∧ (∀y: ¬ y = x) ¬ (y is a book ∧ Ann gave Bill y)) Lbxc

$$(\exists x{:}\ (Bx \land Gabx) \land (\forall y{:}\ \neg\, y = x)\ \neg\,(By \land Gaby))\ Lbxc$$

or:

$$(\exists x{:}\ (Bx \land Gabx) \land (\forall y{:}\ By \land Gaby)\ x = y)\ Lbxc$$

using the description operator:

Bill lent the book Ann gave him to Carol

Lb(the book Ann gave Bill)c

Lb(Ix x is a book Ann gave Bill)c

Lb(Ix (x is a book ∧ Ann gave Bill x))c

$$Lb(\mathrm{I}x\,(Bx \land Gabx))c$$

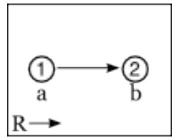
B: [_ is a book]; G: [_ gave _ _]; L: [_ lent _ to _]; a: Ann; b: Bill; c: Carol

5.

	∃x ∃y (Rxy ∧ Sxy)	1
	ⓐ ∃y (Ray ∧ Say)	2
	ⓑ Rab ∧ Sab	3
3 Ext	Rab	(4)
3 Ext	Sab	(4)
4 Adj	Sab ∧ Rab	X, (5)
5 EG	∃x (Sxb ∧ Rxb)	X, (6)
6 EG	∃y ∃x (Sxy ∧ Rxy)	X, (7)
	•	
7 QED	∃y ∃x (Sxy ∧ Rxy)	2
2 PCh	∃y ∃x (Sxy ∧ Rxy)	1
1 PCh	∃y ∃x (Sxy ∧ Rxy)	

6.

	∃x Rax	
	ⓑ Rab	
	∀x ¬ Rxa	a:3,b:4
3 UI	¬ Raa	
4 UI	¬ Rba	
	○	Rab, ¬Raa, ¬Rba ⇏ ⊥
	⊥	2
2 NcP	∃x Rxa	1
1 PCh	∃x Rxa	



7. A set Γ is inconsistent if and only if there is no possible world in which every member of Γ is true.

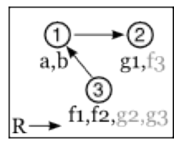
8. range: 1, 2, 3

a	b
1	2

τ	fτ
1	3
2	3
3	2

τ	gτ
1	2
2	3
3	3

R	1	2	3
1	F	T	F
2	F	F	F
3	T	F	F



Only non-arbitrary values of f and g are shown

(b = gb ∨ Ra(ga)) → (R(fa)(ga) ∧ f(gb) = g(fb))

2 F 3 2 T T 1 21 Ⓕ F 31 21 F 2 32 F 3 32

Your values for some of the compound terms and equations may differ from those shown here in gray, but your values for other predications and for truth-functional compounds should be the same as those shown.

The diagram above provides a complete answer, and so do the tables to its left. The tables below show a way of arriving at these answers.

alias sets	*IDs*	*values*
a	1	a: 1
b	2	b: 2
ga		g1: 2
fa	3	f1: 3
fb		f2: 3
f(ga)		f2: 3

resources	*values*
Rab	R12: **T**
R(fa)a	R31: **T**
¬ R(fb)b	R32: **F**

9. The following are 3 possibilities (up to choice of the variable) from which your two might be chosen; in the last, τ may be any term:

$[\exists y\ Rxyb]_x a$, $[\exists y\ Rayx]_x b$, $[\exists y\ Rayb]_x \tau$