**Phi 270 F97 quiz 6 (of 6)** in pdf format

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.

$$\frac{\exists x\ (\exists y\text{: } Rxy)\ Sxy}{\exists y\ (\exists x\text{: } Sxy)\ Rxy}$$

[ answer ]

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

$$\frac{\exists x\ Rax}{\exists x\ Rxa}$$

[ 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 either using tables or, where possible, using diagrams.)

*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.** [This question was on a topic not covered in F04] Give two different restatements of the sentence below in expanded form as a complex predicate (i.e., a lambda abstract) applied to a term.

∃y Rayb

[answer]

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**Phi 270 F97 quiz 6 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: λxy (x *phoned* y); L: λxyz (x *had left* y *for* z); M: λx (x *is a message*); P: λx (x *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: λx (x *is a child*); D: λxyz (x *said* y *to* z); 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)

∃x (∃ y: ¬ y = x) (Arsx ∧ Arsy)

[A: λxyz (x *asked* y *for* z); 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

(∃x: (Bx ∧ Gabx) ∧ (∀y: ¬ y = x) ¬ (By ∧ Gaby)) Lbxc

*or:*

(∃x: (Bx ∧ Gabx) ∧ (∀y: By ∧ 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(Ix (Bx ∧ Gabx))c

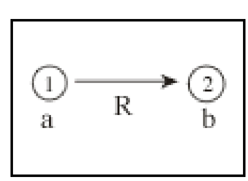
[B: λx (x *is a book*); G: λxyz (x *gave* y z); L: λxyz (x *lent* y *to* z); a: *Ann*; b: *Bill*; c: *Carol*]

**5.**

| ∃x (∃y: Rxy) Sxy
| ⓐ
| | (∃y: Ray) Say
| | ⓑ
| | | Rab (3)
| | | Sab (3)
3 REG | | | (∃x: Sxb) Rxb X, (4)
4 EG | | | ∃y (∃x: Sxy) Rxy X, (5)
| | | •
5 QED | | | ∃y (∃x: Sxy) Rxy 2
2 PRCh | | ∃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.** b = ga, fa = f(ga), Rab, R(fa)a, ¬ R(fb)b

| *alias sets* | *IDs* | *values* | *resources* | *values* |
|---|---|---|---|---|
| a | 1 | a: 1 | Rab | R12: **T** |
| b | 2 | b: 2 | R(fa)a | R31: **T** |
| ga | | g1: 2 | ¬ R(fb)b | R32: **F** |
| fa | 3 | f1: 3 | | |
| fb | | f2: 3 | | |
| f(ga) | | f2: 3 | | |

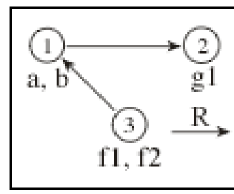
range: 1, 2, 3

| a | b |
|---|---|
| 1 | 2 |

| τ | fτ |
|---|---|
| 1 | 3 |
| 2 | 3 |
| 3 | 1 |

| τ | gτ |
|---|---|
| 1 | 2 |
| 2 | 1 |
| 3 | 1 |

| 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 1 2 T T 1 21 Ⓕ F 31 21 F 3 12 F 1 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.)

**9.** [This question was on a topic not covered in F04] 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:

[λx ∃y Rxyb]a, [λx ∃y Rayx]b, [λx ∃y Rayb]τ