Phi 270 F98 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. George traveled to LA by way of some town in Wyoming. [Give this analysis also using an unrestricted quantifier.]

answer

2. Everyone is afraid of something. [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. Spot knew exactly one trick.

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.

Tom opened the letter from Bulgaria

answer

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

$$\frac{\exists x\,(Fx \land \exists y\, \neg\, x = y)}{\exists x\, \exists y\,(\neg\, y = x \land Fy)}$$

That is: Some finding is different from something ⇒ Something is such that something different from it is a finding [but don't hesitate to ignore the English if it doesn't help].

answer

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

$$\frac{\exists x\, \exists y\, Rxy}{\exists x\, Rxx}$$

answer

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

A sentence φ is equivalent to a sentence ψ if and only if …

answer

8. Describe a structure (i.e., an assignment of extensions to the non-logical vocabulary) which makes the 8 sentences at the left below all true.

fab = fba, ga = fab, fba = c, Fb, F(ga), Rab, ¬ Rba, R(ga)c

answer

9. [This question was on a topic not covered in F06] Use replacement by equivalence to put the following sentence into disjunctive normal form. Show how you reach your result; you may combine uses of associativity and commutativity with other principles in a single step but there should be no more than one use of De Morgan's laws or distributivity in each step.

¬ ((A ∧ B) ∨ (C ∨ D))

answer

Phi 270 F98 test 5 answers

1. George traveled to LA by way of some town in Wyoming
some town in Wyoming is such that (George traveled to LA by way of it)
(∃x: x is a town in Wyoming) George traveled to LA by way of x
(∃x: x is a town ∧ x is in Wyoming) George traveled to LA by way of x

(∃x: Tx ∧ Nxm) Rglx
∃x ((Tx ∧ Nxm) ∧ Rglx)

N: [_ is in _]; R: [_ traveled to _ by way of _]; T: [_ is a town]; g: George; l: LA; m: Wyoming

2. *first analysis:*
Everyone is afraid of something
everyone is such that (he or she is afraid of something)
(∀x: x is a person) x is afraid of something
(∀x: Px) something is such that (x is afraid of it)
(∀x: Px) ∃y x is afraid of y

(∀x: Px) ∃y Axy

second analysis:
Everyone is afraid of something
something is such that (everyone is afraid of it)
∃x everyone is afraid of x
∃x everyone is such that (he or she is afraid of x)
∃x (∀y: y is a person) y is afraid of x

∃x (∀y: Py) Ayx

A: [_ is afraid of _]; P: [_ is a person]
The first is true and the second false if all people are fearful but not

all fearful of the same thing

3. Spot knew exactly one trick

Spot knew a trick ∧ ¬ Spot knew at least two tricks

(∃ x: x is a trick) Spot knew x ∧ ¬ (∃ x: x is a trick) (∃ y: y is a trick ∧ ¬ y = x) (Spot knew x ∧ Spot knew y)

(∃ x: Tx) Ksx ∧ ¬ (∃ x: Tx) (∃ y: Ty ∧ ¬ y = x) (Ksx ∧ Ksy)

or:

(∃ x: Tx) (Ksx ∧ (∀ y: Ty ∧ ¬ y = x) ¬ Ksy)

or:

(∃ x: Tx) (Ksx ∧ (∀ y: Ty ∧ Ksy) x = y)

K: [_ knew _]; T: [_ is a trick]; s: Spot

4. *using Russell's analysis:*

Tom opened the letter from Bulgaria

the letter from Bulgaria is such that (Tom opened it)

(∃x: x and only x is a letter from Bulgaria) Tom opened x

(∃x: x is a letter from Bulgaria ∧ (∀y: ¬ y = x) ¬ y is a letter from Bulgaria) Otx

(∃x: x is a letter ∧ x is from Bulgaria ∧ (∀y: ¬ y = x) ¬ y is a letter ∧ y is from Bulgaria) Otx

(∃x: (Lx ∧ Fxb) ∧ (∀y: ¬ y = x) ¬ (Ly ∧ Fyb)) Otx

or:

(∃x: (Lx ∧ Fxb) ∧ (∀y: Ly ∧ Fyb) x = y) Otx

using the description operator:

Tom opened the letter from Bulgaria

Ot(the letter from Bulgaria)

Ot(ιx x is a letter from Bulgaria)

Ot(ιx (x is a letter ∧ x is from Bulgaria))

Ot(ιx (Lx ∧ Fxb))

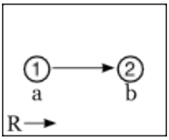
F: [_ is from _]; L: [_ is a letter]; O: [_ opened _]; b: Bulgaria; t: Tom

5.

	∃x (Fx ∧ ∃y ¬ x = y)	1
	ⓐ	
	Fa ∧ ∃y ¬ a = y	2
2 Ext	Fa	(4)
2 Ext	∃y ¬ a = y	3
	ⓑ	
	¬ a = b	(4)
4 Adj	¬ a = b ∧ Fa	X, (5)
5 EG	∃y (¬ y = b ∧ Fy)	X, (6)
6 EG	∃x ∃y (¬ y = x ∧ Fy)	X, (7)
	●	
7 QED	∃x ∃y (¬ y = x ∧ Fy)	3
3 PCh	∃x ∃y (¬ y = x ∧ Fy)	1
1 PCh	∃x ∃y (¬ y = x ∧ Fy)	

6.

	∃x ∃y Rxy	1
	ⓐ	
	∃y Ray	2
	ⓑ	
	Rab	
	∀x ¬ Rxx	a:4,b:5
4 UI	¬ Raa	
5 UI	¬ Rbb	
	○	Rab, ¬Raa, ¬Rbb ⇏ ⊥
	⊥	3
3 NcP	∃x Rxx	2
2 PCh	∃x Rxx	1
1 PCh	∃x Rxx	



7. A sentence φ is equivalent to a sentence ψ if and only if there is no possible world in which φ and ψ have different truth values

8. range: 1, 2, 3

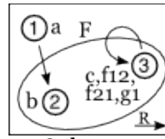
a	b	c
1	2	3

f	1	2	3
1	1	3	1
2	3	1	1
3	1	1	1

τ	gτ
1	3
2	1
3	1

τ	Fτ
1	F
2	T
3	T

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



Only non-arbitrary values are shown for f and g

The diagram provides a complete answer, as do the tables to its left. The tables below are a way of finding this structure.

alias sets	*IDs*	*values*
a	1	a: 1
b	2	b: 2
c	3	c: 3
fab		f12: 3
fba		f21: 3
ga		g1: 3

resources	*values*
Fb	F2: **T**
F(ga)	F3: **T**
Rab	R12: **T**
¬ Rba	R21: **F**
R(ga)c	R33: **T**

9. [This question was on a topic not covered in F06]

$$\neg((A \wedge B) \vee (C \vee \neg D))$$
$$\Leftrightarrow$$
$$\neg(A \wedge B) \wedge \neg(C \vee \neg D)$$
$$\Leftrightarrow$$
$$(\neg A \vee \neg B) \wedge (\neg C \wedge D)$$
$$\Leftrightarrow$$
$$(\neg A \wedge \neg C \wedge D) \vee (\neg B \wedge \neg C \wedge D)$$