Phi 270 F05 test 5

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. Notice the special instructions given for each of **1**, **2**, and **3**.

1. A bell rang. [Give an analysis using a restricted quantifier, and restate it using an unrestricted quantifier.]
answer

2. There was a storm but no flight was delayed. [Avoid using ∀ in your analysis of any quantifier phrases in this sentence.]
answer

3. Everyone was humming a tune. [On one way of understanding this sentence, it would be false if people were humming different tunes. Analyze it according to that interpretation.]
answer

4. Tom saw at least two snowflakes.
answer

Analyze the sentence below using each of the two ways of analyzing the definite description. That is, give an analysis that uses Russell's treatment of definite descriptions as quantifier phrases as well as one that uses the description operator.

5. Ann saw the play.
answer

Use a derivation to show that the following argument is valid. You may use any rules.

6. $\exists x\,(Fa \rightarrow Gx)$

$Fa \rightarrow \exists x\,Gx$

answer

Use a derivation to show that the following argument is not valid, and use either a diagram or tables to present a counterexample that divides an open gap of your derivation.

7. $\exists x\,Fx$
$\exists x\,Rxa$

$\exists x\,(Fx \wedge Rxa)$

answer

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

8. A set Γ of sentences is inconsistent (in symbols, $\Gamma \Rightarrow$ or, equivalently, $\Gamma \Rightarrow \perp$) if and only if ...
answer

Complete the following truth table for the two rows shown. In each row, indicate the value of each compound component of the sentence on the right by writing the value under the main connective of that component (so, in each row, every connective should have a value under it); also circle the value that is under the main connective of the whole sentence.

9.

A	B	C	D	(A → ¬ C) ∧ ¬ (B ∨ D)
T	F	F	F	
F	F	T	T	

answer

Phi 270 F05 test 5 answers

1. A bell rang
Some bell is such that (it rang)
(∃x: x is a bell) x rang
(∃x: Bx) Rx
∃x (Bx ∧ Rx)
B: [_ is a bell]; R: [_ rang]

2. There was a storm but no flight was delayed
There was a storm ∧ no flight was delayed
Something was a storm ∧ ¬ some flight was delayed
Something is such that (it was a storm) ∧ ¬ some flight is such that (it was delayed)
∃x x was a storm ∧ ¬ (∃x: x is a flight) x was delayed
∃x Sx ∧ ¬ (∃x: Fx) Dx
D: [_ was delayed]; F: [_ is a flight]; S: [_ was a storm]

3. Everyone was humming a tune
Some tune is such that (everyone was humming it)
(∃x: x is a tune) everyone was humming x
(∃x: Tx) everyone is such that (he or she was humming x)
(∃x: Tx) (∀y: y is a person) (y was humming x)
(∃x: Tx) (∀y: Py) Hyx
H: [_ was humming _]; P: [_ is a person]; T: [_ is a tune]

Everyone is such that (he or she was humming a tune) could be true even though people were humming different tunes, so an analysis of it would not be a correct answer.

4. Tom saw at least two snowflakes
At least two snowflakes are such that (Tom saw them)
(∃x: x is a snowflake) (∃y: y is a snowflake ∧ ¬ y = x) (Tom saw x ∧ Tom saw y)
(∃x: Fx) (∃y: Fy ∧ ¬ y = x) (Stx ∧ Sty)
F: [_ is a snowflake]; S: [_ saw _]; t: Tom

5. *Using Russell's analysis:*

Ann saw the play
The play is such that (Ann saw it)
(∃x: x is a play ∧ (∀y: ¬ y = x) ¬ y is a play) Ann saw x
(∃x: Px ∧ (∀y: ¬ y = x) ¬ Py) Sax
also correct:
(∃x: Px ∧ ¬ (∃y: ¬ y = x) Py) Sax
or:
(∃x: Px ∧ (∀y: Py) x = y) Sax

Using the description operator:

Ann saw the play
S Ann the play
Sa (ιx x is a play)
Sa(ιx Px)

P: [_ is a play]; S: [_ saw _]; a: Ann

6.

	∃x (Fa → Gx)	2
	Fa	(3)
	ⓑ	
	Fa → Gb	3
3 MPP	Gb	(4)
4 EG	∃x Gx	X,(5)
	●	
5 QED	∃x Gx	2
2 PCh	∃x Gx	1
1 CP	Fa → ∃x Gx	

or

	∃x (Fa → Gx)	2
	Fa	(3)
	ⓑ	
	Fa → Gb	3
3 MPP	Gb	(6)
	∀x ¬ Gx	b:5
5 UI	¬ Gb	(6)
	●	
6 Nc	⊥	4
4 NcP	∃x Gx	2
2 PCh	∃x Gx	1
1 CP	Fa → ∃x Gx	

The order of CP and PCh can be reversed in these and the use of MPP in the second could come after NcP and UI.

7.

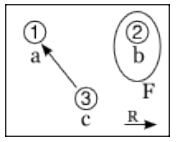
	∃x Fx	1
	∃x Rxa	2
	ⓑ	
	Fb	(5)
	ⓒ	
	Rca	(7)
	∀x ¬ (Fx ∧ Rxa)	b:4, c:6, a:8
4 UI	¬ (Fb ∧ Rba)	5
5 MPT	¬ Rba	
6 UI	¬ (Fc ∧ Rca)	7
7 MPT	¬ Fc	
8 UI	¬ (Fa ∧ Raa)	9
	¬ Fa	
	○	Fb,Rca,¬Rba,¬Fc,¬Fa ⇏ ⊥
	⊥	11
11 IP	Fa	10
	¬ Raa	
	○	Fb,Rca,¬Rba,¬Fc,¬Raa ⇏ ⊥
	⊥	12
12 IP	Raa	10
10 Cnj	Fa ∧ Raa	9
9 CR	⊥	3
3 NcP	∃x (Fx ∧ Rxa)	2
2 PCh	∃x (Fx ∧ Rxa)	1
1 PCh	∃x (Fx ∧ Rxa)	

range: 1, 2, 3

a	b	c
1	2	3

τ	Fτ
1	F
2	T
3	F

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



This interpretation divides both gaps; the value for F1 is needed only for the first gap and the value for R11 is needed only for the second.

8. A set Γ of sentences is inconsistent if and only if there is no possible world in which all members of Γ are true

or

A set Γ of sentences is inconsistent if and only if, in each possible world, at least one member of Γ is false

9.

A	B	C	D	(A → ¬ C)	∧	¬ (B ∨ D)
T	F	F	F	T T	Ⓣ T	F
F	F	T	T	T F	Ⓕ F	T

Phi 270 F04 test 5

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. Notice the special instructions given for **1** and **3**.

1. Someone was singing [Present your analysis also using an unrestricted quantifier.]

answer

2. There is a package that isn't addressed to anyone.

answer

3. An airline served each airport. [This sentence is ambiguous. On one way of interpreting it, it could be true even if no one airline served all airports. Analyze the sentence according to that interpretation of it.]

answer

4. At least two people called.

answer

Analyze the sentence below using each of the two ways of analyzing the definite description the sleigh Santa drove. That is, give an analysis that uses Russell's treatment of definite descriptions as quantifier phrases and another analysis that uses the description operator.

5. The sleigh Santa drove was red.

answer

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

6. ∃x (Fx ∧ Gx)

∃x Gx

answer

7. ∃x (Fx ∧ ∃y Rxy)

∃x ∃y (Fy ∧ Ryx)

answer

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

8. A sentence φ is entailed by a set Γ (i.e., Γ ⇒ φ) if and only if ...

answer

Complete the following truth table for the two rows shown. Indicate the value of each component of the sentence on the right by writing the value under the main connective of that component.

9.

A	B	C	D	¬ (A ∧ B) → (¬ C ∨ D)
T	T	F	F	
F	F	T	F	

answer

Use either tables or a diagram to describe a structure in which the following sentences are true. (That is, do what would be required to present a counterexample when a dead-end gap of a derivation had these sentences as its active resources.)

10. a = c, fa = fb, ¬ Ga, Gb, G(fc), Ra(fb), Rb(fa)

answer

Phi 270 F04 test 5 answers

1. Someone was singing
Someone is such that (he or she was singing)
(∃x: x is a person) x was singing
(∃x: Px) Sx
∃x (Px ∧ Sx)
P: [_ is a person]; S: [_ was singing]

2. There is a package that isn't addressed to anyone
Something is a package that isn't addressed to anyone
∃x x is a package that isn't addressed to anyone
∃x (x is a package ∧ x isn't addressed to anyone)
∃x (Kx ∧ ¬ x is addressed to someone)
∃x (Kx ∧ ¬ someone is such that (x is addressed to him or her))
∃x (Kx ∧ ¬ (∃y: y is a person) x is addressed to y)
∃x (Kx ∧ ¬ (∃y: Py) Axy)
or: ∃x (Kx ∧ (∀y: Py) ¬ Axy)
A: [_ is addressed to _]; K: [_ is a package]; P: [_ is a person]

3. An airline served each airport
Every airport is such that (an airline served it)
(∀x: x is an airport) an airline served x
(∀x: Ax) some airline is such that (it served x)
(∀x: Ax) (∃y: y is an airline) y served x
(∀x: Ax) (∃y: Ly) Syx
P: [_ is an airport]; L: [_ is an airline]; S: [_ served _]
(∃x: Lx) (∀y: Ay) Sxy would be incorrect since it is true only if there is a single airline that serves all airports

4. At least two people called
At least two people are such that (they called)
(∃x: x is a person) (∃y: y is a person ∧ ¬ y = x) (x called ∧ y called)
(∃x: Px) (∃y: Py ∧ ¬ y = x) (Cx ∧ Cy)
C: [_ called]; P: [_ is a person]

5. Using Russell's analysis:
The sleigh Santa drove was red
The sleigh Santa drove is such that (it was red)
(∃x: x is a sleigh Santa drove ∧ (∀y: ¬ y = x) ¬ y is a sleigh Santa drove) x was red
(∃x: (x is a sleigh ∧ Santa drove x) ∧ (∀y: ¬ y = x) ¬ (y is a sleigh ∧ Santa drove y)) x was red
(∃x: (Sx ∧ Dsx) ∧ (∀y: ¬ y = x) ¬ (Sy ∧ Dsy)) Rx
Using the description operator:
The sleigh Santa drove was red
R (the thing such that (it is a sleigh Santa drove))
R (ιx x is a sleigh Santa drove)
R (ιx (x is a sleigh ∧ Santa drove x))
R(ιx (Sx ∧ Dsx))
D: [_ drove _]; R: [_ was red]; S: [_ is a sleigh]; s: Santa

6.

	∃x (Fx ∧ Gx)	1
	ⓐ	
	Fa ∧ Ga	2
2 Ext	Fa	
2 Ext	Ga	(3)
3 EG	∃x Gx	X, (4)
	•	
4 QED	∃x Gx	1
1 PCh	∃x Gx	

or

	∃x (Fx ∧ Gx)	1
	ⓐ	
	Fa ∧ Ga	2
2 Ext	Fa	
2 Ext	Ga	(5)
	∀x ¬ Gx	a: 4
4 UI	¬ Ga	(5)
	•	
5 Nc	⊥	3
3 NcP	∃x Gx	1
1 PCh	∃x Gx	

7.

	∃x (Fx ∧ ∃y Rxy)	1
	ⓐ	
	Fa ∧ ∃y Ray	2
2 Ext	Fa	(4)
2 Ext	∃y Ray	3
	ⓑ	
	Rab	(4)
4 Adj	Fa ∧ Rab	X, (5)
5 EG	∃y (Fy ∧ Ryb)	X, (6)
6 EG	∃x ∃y (Fy ∧ Ryx)	X, (7)
	•	
7 QED	∃x ∃y (Fy ∧ Ryx)	3
3 PCh	∃x ∃y (Fy ∧ Ryx)	1
1 PCh	∃x ∃y (Fy ∧ Ryx)	

or

	∃x (Fx ∧ ∃y Rxy)	1
	ⓐ	
	Fa ∧ ∃y Ray	2
2 Ext	Fa	(9)
2 Ext	∃y Ray	
	ⓑ	
	Rab	(10)
	∀x ¬ ∃y (Fy ∧ Ryx)	b: 5
5 UI	¬ ∃y (Fy ∧ Ryb)	6
	∀y ¬ (Fy ∧ Ryb)	a :8
8 UI	¬ (Fa ∧ Rab)	9
9 MPT	¬ Rab	(10)
	•	
10 Nc	⊥	7
7 NcP	∃y (Fy ∧ Ryb)	6
6 CR	⊥	4
4 NcP	∃x ∃y (Fy ∧ Ryx)	3
3 PCh	∃x ∃y (Fy ∧ Ryx)	1
1 PCh	∃x ∃y (Fy ∧ Ryx)	

8. A sentence φ is entailed by a set Γ if and only if there is no possible world in which φ is false while all members of Γ are true

or

A sentence φ is entailed by a set Γ if and only φ is true in every possible world in which all members of Γ are true

9.

A	B	C	D	¬ (A ∧ B) → (¬ C ∨ D)					
T	T	F	F	F	T	Ⓣ	T	T	
F	F	T	F	T	F	Ⓕ	F	F	

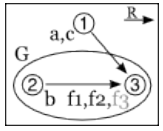
10. range: 1, 2, 3

a	b	c
1	2	1

τ	fτ
1	3
2	3
3	3

τ	Gτ
1	F
2	T
3	T

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



(The diagram 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
c		c: 1
b	2	b: 2
fa	3	f1: 3
fb		f2: 3
fc		f1: 3

resources	*values*
¬ Ga	G1: **F**
Gb	G2: **T**
G(fc)	G3: **T**
Ra(fb)	R13: **T**
Rb(fa)	R23: **T**

Phi 270 F03 test 5

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. Notice theadditional instructions given for the first.

1. Tom sent something to Sue

answer

2. Everyone heard a sound. [This is ambiguous but you need only analyze one interpretation; justchoose the one that seems most natural to you.]

answer

3. There is someone who knows just one other person.

answer

Analyze the sentence below using each of the two ways of analyzing the definite description the package. That is, analyze it using Russell's analysis of definite descriptions as quantifier phrases and then analyze it again using the description operator.

4. The package rattled.

answer

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

5.

∃x Fx
∀x Gx

∃x (Fx ∧ Gx)

answer

Use a derivation to show that the following argument is not valid and use either tables or a diagram to describe a structure dividing an open gap.

6.

∃x ∀y Rxy

∃x Rax

answer

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

7. A sentence φ is equivalent to a sentence ψ (i.e., φ ⇔ ψ) if and only if ...

answer

Answer the following question and explain your answer in terms of the definitions of the basic concepts it involves.

8. Suppose you are told that (i) $\varphi \Rightarrow \psi$ and (ii) ψ is inconsistent with χ (i.e., the set formed of the twois inconsistent). What can you conclude about the relation between of φ and χ? That is, what patterns of truth values for the two are ruled out (if any are); and, if any are ruled out, what logical relation or relations holds as a result.

answer

Complete the following truth table by calculating the truth value of the sentence on each of the given assignments. In each row, write under each connective the value of the component of which it is the main connective and circle the truth value of the sentence as a whole.

9.

A	B	C	D	(A ∧ ¬ B) ∨ ¬ (C → D)
T	T	T	T	
F	F	T	F	

answer

Phi 270 F03 test 5 answers

1. Tom sent something to Sue

∃x Tom sent x to Sue

∃x Ntxs

C: [_ sent _ to _]; s: Sue; t: Tom

2. Everyone heard a sound

(∃x: x is a sound) everyone heard x

(∃x: x is a sound) (∀y: y is a person) y heard x

(∃x: Sx) (∀y: Py) Hyx

H: [_ heard _]; P: [_ is a person]; S: [_ is a sound]

3. There is someone who knows just one other person

∃x x is a person who knows just one other person

∃x (x is a person ∧ x knows just one other person)

∃x (Px ∧ (∃y: Py ∧ ¬ y = x) x knows y and no other person besides y)

∃x (Px ∧ (∃y: Py ∧ ¬ y = x) (Kxy ∧ x knows no other person besides y))

∃x (Px ∧ (∃y: Py ∧ ¬ y = x) (Kxy ∧ (∀z: Pz ∧ ¬ z = x ∧ ¬ z = y) ¬ Kxz))

or:

∃x (Px ∧ (∃y: Py ∧ ¬ y = x) (Kxy ∧ (∀z: Pz ∧ ¬ z = x ∧ Kxz) y = z))

K: [_ knows _]; P: [_ is a person]

4. *using Russell's analysis:*

The package rattled

(∃x: x and only x is a package) x rattled

(∃x: x is a package ∧ (∀y: ¬ y = x) ¬ y is a package) Rx

(∃x: Px ∧ (∀y: ¬ y = x) ¬ Py) Rx

or:

(∃x: Px ∧ (∀y: Py) x = y) Rx

using the description operator:

The package rattled

R(the package)

R (ιx x is a package)

R(ιx Px)

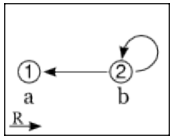
P: [_ is a package]; r: [_ rattled]

5.

	∃x Fx	1
	∀x Gx	a: 2
	ⓐ	
	Fa	(3)
2 UI	Ga	(3)
3 Adj	Fa ∧ Ga	X, (4)
4 EG	∃x (Fx ∧ Gx)	X, (5)
	●	
5 QED	∃x (Fx ∧ Gx)	1
1 PCh	∃x (Fx ∧ Gx)	

6.

	∃x ∀y Rxy	1
	ⓑ	
	∀y Rby	a:3, b:4
	∀x ¬ Rax	a:5, b:6
3 UI	Rba	
4 UI	Rbb	
5 UI	¬ Raa	
6 UI	¬ Rab	
	○	Rba,Rbb,¬Raa,¬Rab ⇏ ⊥
	⊥	2
2 NcP	∃x Rax	1
1 PCh	∃x Rax	



7. φ and ψ are equivalent if and only if there is no possible world in which they have different truth values (or: if and only, in every possible world, each has the same value as the other)

8. φ and χ are inconsistent. That is, φ and χ cannot be both true because ψ will be true when φ is, and ψ and χ cannot be both true. Other patterns of values for φ and χ are possible because they are not ruled out for ψ and χ by the fact that they are inconsistent and, for all weknow, φ and ψ may be equivalent.

9.

A	B	C	D	(A ∧ ¬ B) ∨ ¬ (C → D)				
T	T	T	T		F	F	Ⓕ F	T
F	F	T	F		F	T	Ⓣ T	F

Phi 270 F02 test 5

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. Notice the additional instructions given for the first.

1. Al received a card that made him laugh [Give this analysis also using an unrestricted quantifier.]

answer

2. There is a toy that every child wanted

answer

3. Santa left at least two packages

answer

Analyze the sentence below using each of the two ways of analyzing the definite description the battery. That is, analyze it using Russell's analysis of definite descriptions as quantifier phrases and then analyze it again using the description operator.

4. The battery is dead

answer

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

5.
$$\frac{\exists x\,(Fx \wedge Gx)}{\exists x\,(Gx \wedge Fx)}$$

answer

Use a derivation to show that the following argument is not valid and use either tables or a diagram to describe a structure dividing an open gap.

6.
$$\frac{\exists x\,\exists y\,Rxy}{\exists x\,Rax}$$

answer

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

7. A set Γ entails a sentence φ (i.e., $\Gamma \Rightarrow \varphi$) if and only if ...

answer

Complete the following truth table by calculating the truth value of the sentence on the given assignment. Show the value of each component by writing it under the main connective of that component, and circle the truth value of the sentence as a whole.

8.

A	B	C	D	(A → B) ∧ ¬ (C ∨ ¬ D)
T	F	F	T	

answer

Give at least two restatements of the following sentence as an expansion on a term appearing in it (i.e., as an abstract applied to such a term):

9. Raba

answer

Phi 270 F02 test 5 answers

1. Al received a card that made him laugh

some card that made Al laugh is such that (Al received it)

(∃x: x is a card that made Al laugh) Al received x

(∃x: x is a card ∧ x made Al laugh) Rax

(∃x: Cx ∧ Lxa) Rax

∃x ((Cx ∧ Lxa) ∧ Rax)

C: [_ is a card]; L: [_ made _ laugh]; R: [_ received _]; a: Al

2. There is a toy that every child wanted

Something is a toy that every child wanted

Something is such that (it is a toy that every child wanted)

∃x x is a toy that every child wanted

∃x (x is a toy ∧ every child wanted x)

∃x (Tx ∧ every child is such that (he or she wanted x))

∃x (Tx ∧ (∀y: y is a child) y wanted x)

∃x (Tx ∧ (∀y: Cy) Wyx)

C: [_ is a child]; T: [_ is a toy]; W: [_ wanted _]

3. Santa left at least two packages

at least two packages are such that (Santa left them)

(∃x: x is a package) (∃y: y is a package ∧ ¬ y = x) (Santa left x ∧ Santa left y)

(∃x: Px) (∃y: Py ∧ ¬ y = x) (Lsx ∧ Lsy)

L: [_ left _]; P: [_ is a package]; s: Santa

4. *using Russell's analysis:*

The battery is dead

The battery is such that (it is dead)

(∃x: x and only x is a battery) x is dead

(∃x: x is a battery ∧ (∀y: ¬ y = x) ¬ y is a battery) x is dead

(∃x: Bx ∧ (∀y: ¬ y = x) ¬ By) Dx

or:

(∃x: Bx ∧ (∀y: By) x = y) Dx

B: [_ is a battery]; D: [_ is dead]

using the description operator:

The battery is dead

D the battery

D(ιx x is a battery)

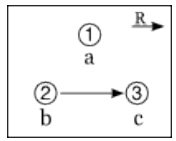
D(ιx Bx)

5.

	∃x (Fx ∧ Gx)	1
	ⓐ	
	Fa ∧ Ga	2
2 Ext	Fa	(6)
2 Ext	Ga	(5)
	∀x ¬ (Gx ∧ Fx)	a:4
4 UI	¬ (Ga ∧ Fa)	5
5 MPT	¬ Fa	(6)
	•	
6 Nc	⊥	3
3 NcP	∃x (Gx ∧ Fx)	1
1 PCh	∃x (Gx ∧ Fx)	

6.

	∃x ∃y Rxy	1
	ⓑ	
	∃y Rby	2
	ⓒ	
	Rbc	
	∀x ¬ Rax	a:4, b:5, c:6
4 UI	¬ Raa	
5 UI	¬ Rab	
6 UI	¬ Rac	
	○	Rbc,¬Raa, ¬Rab,¬Rac ⇏ ⊥
	⊥	3
3 NcP	∃x Rax	2
2 PCh	∃x Rax	1
1 PCh	∃x Rax	



7. A set Γ entails a sentence φ if and only if there is no possible world

in which every member of Γ is true but φ is false (*or:* if and only if φ is true in every possible world in which all members of Γ are true)

8.

A	B	C	D	(A → B) ∧ ¬ (C ∨ ¬ D)
T	F	F	T	F Ⓕ T F F

9. Up to the choice of variables, the possibilities are the following:

$$[Rabx]_x a,\ [Rxba]_x a,\ [Rxbx]_x a,\ [Raxa]_x b$$

Phi 270 Foo test 5

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. Notice the additional instructions given for each of the first two.

1. There is a yak that someone yoked. [Give this analysis also using an unrestricted quantifier.]
answer

2. Each explorer mapped a route. [This sentence is ambiguous. Analyze it in two nonequivalent ways, and describe a situation in which the sentence is true on one of your analyses and false on the other.]
answer

3. Exactly one reindeer was red nosed. [You may leave the predicate _ was red nosed unanalyzed.]
answer

Analyze the sentence below using each of the two ways of analyzing the definite description the fireplace. That is, analyze it using Russell's analysis of definite descriptions as quantifier phrases and then analyze it again using the description operator.

4. Santa gained entry through the fireplace.
answer

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

5.
$$\frac{\exists x\, \forall y\, (Fy \rightarrow Rxy)}{\forall x\, (Fx \rightarrow \exists y\, Ryx)}$$
answer

That is: Something is relevant to all findings ⇒ Each finding has something relevant to it

[Don't hesitate to ignore this English reading if it doesn't help you think about the argument.]

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

6.
$$\frac{\exists x\, \exists y\, (\neg\, y = x \wedge Rxy)}{\exists x\, \neg\, Rxx}$$
answer

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

7. A set Γ is inconsistent if and only if ...
answer

Complete the following truth table by calculating the truth value of the sentence on the given assignment. Show the value of each component by writing it under the main connective of that component.

8.

A	B	C	D	(A ∨ ¬ B) ∧ ¬ (C → D)
T	F	T	F	

answer

Describe a structure (i.e., an assignment of extensions to the non-logical vocabulary) which makes the sentences below all true. (You may use either tables or a diagram.)

9. a = c, fc = b, d = e, Fc, Fd, ¬ Fb, Rab, Rea, R(fa)b, ¬ Re(fc)

answer

Phi 270 Foo test 5 answers

1. There is a yak that someone yoked
something is a yak that someone yoked
something is such that (it is a yak that someone yoked)
∃x x is a yak that someone yoked
∃x (x is a yak ∧ someone yoked x)
∃x (Yx ∧ someone is such that (he or she yoked x))
∃x (Yx ∧ (∃y: y is a person) y yoked x)

∃x (Yx ∧ (∃y: Py) Kyx)
∃x (Yx ∧ ∃y (Py ∧ Kyx))

K: [_ yoked _]; P: [_ is a person]; Y: [_ is a yak]

2. *first analysis:*
Each explorer mapped a route
each explorer is such (he or she mapped a route)
(∀x: x is an explorer) x mapped a route
(∀x: Ex) some route is such that (x mapped it)
(∀x: Ex) (∃y: y is a route) x mapped y

(∀x: Ex) (∃y: Ry) Mxy

second analysis:
Each explorer mapped a route
some route is st (each explorer mapped it)
(∃x: x is a route) each explorer mapped x
(∃x: Rx) each explorer is such that (he or she mapped x)
(∃x: Rx) (∀y: y is an explorer) y mapped x

(∃x: Rx) (∀y: Ey) Myx

P: [_ is an explorer]; M: [_ mapped _]; R: [_ is a route]
The first is true and the second false if every explorer mapped some route or other but no one route was mapped by all explorers

3. Exactly one reindeer was red nosed
at least one reindeer was red nosed ∧ ¬ at least two reindeer were red nosed
some reindeer is such that (it was red nosed) ∧ ¬ at least two reindeer were such that (they were red nosed)
(∃x: x is a reindeer) x was red nosed ∧ ¬ (∃x: x is a reindeer) (∃y: y is a reindeer ∧ ¬ y = x) (x was red nosed ∧ y was red nosed)

(∃ x: Rx) Nx ∧ ¬ (∃ x: Rx) (∃ y: Ry ∧ ¬ y = x) (Nx ∧ Ny)

or:
Exactly one reindeer was red nosed
some reindeer is such that (it was red nosed and no other reindeer was red nosed)
(∃x: x is a reindeer) (x was red nosed and no other reindeer was red nosed)
(∃x: Rx) (Nx ∧ no reindeer other than x was red nosed)
(∃x: Rx) (Nx ∧ no reindeer other than x is such that (it was red nosed)
(∃x: Rx) (Nx ∧ (∀y: y is a reindeer ∧ ¬ y = x) ¬ y was red nosed)

(∃ x: Rx) (Nx ∧ (∀y: Ry ∧ ¬ y = x) ¬ Ny)
or:
(∃ x: Rx) (Nx ∧ (∀y: Ry ∧ Ny) x = y)

N: [_ was red nosed]; R: [_ is a reindeer]
The generalization using the variable y must be resricted to reindeer or else the sentence will say that some reindeer is the only and only thing that is red nosed—i.e., that there is exactly one red-nosed thing and it is a reindeer.

4. *using Russell's analysis:*
Santa gained entry through the fireplace
the fireplace is such that (Santa gained entry through it)
(∃x: x and only x is a fireplace) Santa gained entry through x
(∃x: x is a fireplace ∧ (∀y: ¬ y = x) ¬ y is a fireplace) Gsx

(∃x: Fx ∧ (∀y: ¬ y = x) ¬ Fy) Gsx
or:
(∃x: Fx ∧ (∀y: Fy) x = y) Gsx

using the description operator:
Santa gained entry through the fireplace
G s (the fireplace)
G s (ιx x is a fireplace)

Gs(ιx Fx)

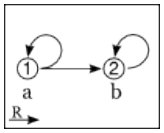
F: [_ is a fireplace]; G: [_ gained entry through _]; s: Santa

5.

	∃x ∀y (Fy → Rxy)	
	ⓐ	
	∀y (Fy → Ray)	b:4
	ⓑ	
	Fb	(5)
4 UI	Fb → Rab	5
5 MPP	Rab	(6)
6 EG	∃y Ryb	X, (7)
	•	
7 QED	∃y Ryb	3
3 CP	Fb → ∃y Ryb	2
2 UG	∀x (Fx → ∃y Ryx)	1
1 PCh	∀x (Fx → ∃y Ryx)	

6.

	∃x ∃y (¬ y = x ∧ Rxy)	1
	ⓐ	
	∃y (¬ y = a ∧ Ray)	2
	ⓑ	
	¬ b = a ∧ Rab	3
3 Ext	¬ b = a	
3 Ext	Rab	
	∀x Rxx	a:5, b:6
5 UI	Raa	
6 UI	Rbb	
	○	¬ b = a, Rab, Raa, Rbb ⇏ ⊥
	⊥	4
4 NcP	∃x ¬ Rxx	2
2 PCh	∃x ¬ Rxx	1
1 PCh	∃x ¬ Rxx	



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

8.

A	B	C	D	(A ∨ ¬ B)	∧	¬	(C → D)
T	F	T	F	T	T	Ⓣ	T	F

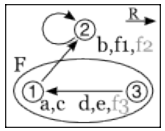
9. range: 1, 2, 3

a	b	c	d	e
1	2	1	3	3

τ	fτ
1	2
2	2
3	3

τ	Fτ
1	T
2	F
3	T

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



(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
c		c: 1
b	2	b: 2
fa		f1: 2
fc		f1: 2
d	3	d: 3
e		e: 3

resources	*values*
Fc	F1: **T**
Fd	F3: **T**
¬ Fb	F2: **F**
Rab	R12: **T**
Rea	R31: **T**
R(fa)b	R22: **T**
¬ Re(fc)	R32: **F**

Phi 270 F99 test 5

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. Notice the additional instructions given for each of the first two.

1. Sam mentioned someone Tina didn't know. [Give this analysis also using an unrestricted quantifier.]

answer

2. Every shoe fit someone. [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. Sam found at least two pieces.

answer

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.

4. The elephant standing on Sam sighed.

answer

[The following question was on a topic not covered in F06] Put the following sentence into prenex normal form (i.e., into a form which contains no restricted quantifiers and in which no quantifier is in the scope of a connective). Show each step where you move a quantifier past a connective separately.

5. $\neg \forall x ((Px \wedge \exists y\ Rxy) \rightarrow \exists z\ Sxz)$

answer

Use derivations to show that the following argument is valid. You may use attachment rules (but not replacement by equivalence).

6.
$$\begin{array}{c} \forall x\ \forall y\ (Rxy \rightarrow (Ryx \rightarrow Rxx)) \\ \exists x\ \exists y\ (Rxy \wedge Ryx) \\ \hline \exists x\ Fxx \end{array}$$

answer

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

7.
$$\begin{array}{c} \exists x\ Fx \\ \exists x\ (Gx \wedge Hx) \\ \hline \exists x\ (Fx \wedge Hx) \end{array}$$

answer

Complete the following to give a definition of entailment by a single sentence (i.e., implication) in terms of truth values and possible worlds:

8. A sentence φ entails a sentence ψ if and only if ...

answer

Complete the following truth table by calculating the truth value of the sentence on the given assignment. Show the value of each component by writing it under the main connective of that component.

9.

A	B	C	D	¬ (A ∧ B) → (C ∨ ¬ D)
T	F	F	T	

answer

Describe a structure (i.e., an assignment of extensions to the non-logical vocabulary) which makes the sentences below all true. (You may use either tables or a diagram.)

10. a = fb, fb = fc, fa = c, Pa, Pb, ¬ Pc, Rab, Rbc, Rc(fb)

answer

Phi 270 F99 test 5 answers

1. Sam mentioned someone Tina didn't know

someone Tina didn't know is such that (Sam mentioned him or her)

(∃x: x is a person Tina didn't know) Sam mentioned x

(∃x: x is a person ∧ ¬ Tina knew x) Sam mentioned x

(∃x: Px ∧ ¬ Ktx) Msx

∃x ((Px ∧ ¬ Ktx) ∧ Msx)

K: [_ knew _]; M: [_ mentioned _]; P: [_ is a person]; s: Sam; t: Tina

2. *first analysis:*

Every shoe fit someone

every shoe is such that (it fit someone)

(∀x: x is a shoe) x fit someone

(∀x: Sx) someone is such that (x fit him or her)

(∀x: Sx) (∃y: y is a person) x fit y

(∀x: Sx) (∃y: Py) Fxy

second analysis:

Every shoe fit someone

someone is such that (every shoe fit him or her)

(∃x: x is a person) every shoe fit x

(∃x: Px) every shoe is such that (it fit x)

(∃x: Px) (∀y: y is a shoe) y fit x

(∃x: Px) (∀y: Sy) Fyx

F: [_ fit _]; P: [_ is a person]; S: [_ is a shoe]
The first is true and the second false if every shoe could be worn but not all by the same person

3. Sam found at least two pieces
at least two pieces are such that (Sam found them)
(∃x: x is a piece) (∃y: y is a piece ∧ ¬ y = x) (Sam found x ∧ Sam found y)

(∃ x: Px) (∃ y: Py ∧ ¬ y = x) (Fsx ∧ Fsy)

F: [_ found _]; P: [_ is a piece]; s: Sam

4. *using Russell's analysis:*
The elephant standing on Sam sighed
The elephant standing on Sam is such that (it sighed)
(∃x: x and only x is an elephant standing on Sam) x sighed
(∃x: x is an elephant standing on Sam ∧ (∀y: ¬ y = x) ¬ y is an elephant standing on Sam) Sx
(∃x: (x is an elephant ∧ x is standing on Sam) ∧ (∀y: ¬ y = x) ¬ (y is an elephant ∧ y is standing on Sam)) Sx

(∃x: (Ex ∧ Txs) ∧ (∀y: ¬ y = x) ¬ (Ey ∧ Tys)) Sx

or:

(∃x: (Ex ∧ Txs) ∧ (∀y: Ey ∧ Tys) x = y) Sx

using the description operator:
The elephant standing on Sam sighed
S (the elephant standing on Sam)
S (ιx x is an elephant standing on Sam)
S (ιx (x is an elephant ∧ x is standing on Sam))

S(ιx (Ex ∧ Txs))

E: [_ is an elephant]; S: [_ sighed]; T: [_ is standing on _]; s: Sam

5. [The following question was on a topic not covered in F06]

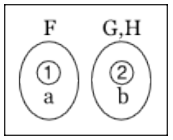
¬ ∀x ((Px ∧ ∃y Rxy) → ∃z Sxz)
∃x ¬ ((Px ∧ ∃y Rxy) → ∃z Sxz)
∃x ¬ (∃y (Px ∧ Rxy) → ∃z Sxz)
∃x ¬ ∀y ((Px ∧ Rxy) → ∃z Sxz)
∃x ∃y ¬ ((Px ∧ Rxy) → ∃z Sxz)
∃x ∃y ¬ ∃z ((Px ∧ Rxy) → Sxz)
∃x ∃y ∀z ¬ ((Px ∧ Rxy) → Sxz)

6.

	∀x ∀y (Rxy → (Ryx → Rxx))	a:4
	∃x ∃y (Rxy ∧ Ryx)	1
	ⓐ	
	∃y (Ray ∧ Rya)	2
	ⓑ	
	Rab ∧ Rba	3
3 Ext	Rab	(6)
3 Ext	Rba	(7)
4 UI	∀y (Ray → (Rya → Raa))	b:5
5 UI	Rab → (Rba → Raa)	6
6 MPP	Rba → Raa	7
7 MPP	Raa	(8)
8 EG	∃x Rxx	X, (9)
	●	
9 QED	∃x Rxx	2
2 PCh	∃x Rxx	1
1 PCh	∃x Rxx	

7.

	∃x Fx	1	
	∃x (Gx ∧ Hx)	2	
	ⓐ		
	Fa	(7)	
	ⓑ		
	Gb ∧ Hb	3	
3 Ext	Gb		
3 Ext	Hb	(8)	
	∀x ¬ (Fx ∧ Hx)	a:5, b:6	
5 UI	¬ (Fa ∧ Ha)	7	
6 UI	¬ (Fb ∧ Hb)	8	
7 MPT	¬ Ha		
8 MPT	¬ Fb		
	○	Fa,Gb,Hb,¬Ha,¬Fb ⇏ ⊥	
	⊥	4	
4 NcP	∃x (Fx ∧ Hx)	2	
2 PCh	∃x (Fx ∧ Hx)	1	
1 PCh	∃x (Fx ∧ Hx)		



8. A sentence φ entails a sentence ψ if and only if there is no possible world in which φ is true but ψ is false (*or:* if and only if ψ is true in every possible world in which φ is true)

9.

A	B	C	D	¬ (A ∧ B) → (C ∨ ¬ D)
T	F	F	T	T F Ⓕ F F

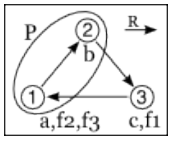
10. range: 1, 2, 3

a	b	c
1	2	3

τ	fτ
1	3
2	1
3	1

τ	Pτ
1	T
2	T
3	F

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



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

alias sets	*IDs*	*values*
a	1	a: 1
fb		f2: 1
fc		f3: 1
b	2	b: 2
c	3	c: 3
fa		f1: 3

resources	*values*
Pa	P1: **T**
Pb	P2: **T**
¬ Pc	P3: **F**
Rab	R12: **T**
Rbc	R23: **T**
Rc(fb)	R31: **T**

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.

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

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

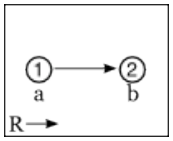
Ot(ℑx (Lx ∧ Fxb))

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

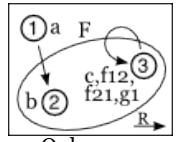
8. range: 1, 2, 3

a b c	f	1	2	3
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]

¬ ((A ∧ B) ∨ (C ∨ ¬ D))

⇔

¬ (A ∧ B) ∧ ¬ (C ∨ ¬ D)

⇔

(¬ A ∨ ¬ B) ∧ (¬ C ∧ D)

⇔

(¬ A ∧ ¬ C ∧ D) ∨ (¬ B ∧ ¬ C ∧ D)

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: $(b = gb \vee Ra(ga)) \rightarrow (R(fa)(ga) \wedge f(gb) = g(fb))$

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.

$\exists y\, Rayb$

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)

∃x (∃ y: ¬ y = x) (Arsx ∧ 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

(∃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(ιx x is a book Ann gave Bill)c

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

Lb(ιx (Bx ∧ Gabx))c

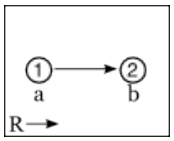
B: [_ is a book]; G: [_ gave _ _]; L: [_ lent _ to _]; a: Ann; b: Bill; c: Carol

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.

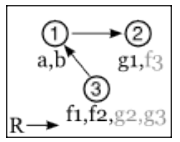
8. range: 1, 2, 3

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:

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

Phi 270 F96 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. Ned has visited a museum in Linden. [Give this analysis also using an unrestricted quantifier.]

answer

2. Something blocked each route. [This sentence is ambiguous. Analyze it in two ways, as making a claim of *general exemplification* and as making the stronger claim of *uniformly general exemplification*, and indicate which analysis is which.]

answer

3. At most one plan was implemented.

answer

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.

4. The scout you saw saw you.

answer

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

5.
$$\frac{\exists x\ Rax \qquad \forall x\ (\exists y\ Ryx \rightarrow Fx)}{\exists x\ Fx}$$

answer

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

6.
$$\frac{\exists x\ Fx \qquad Ga}{\exists x\ (Fx \wedge Gx)}$$

answer

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

7. A sentence φ is entailed by a set Γ if and only if ...

answer

Describe a structure (i.e., an assignment of extensions to the non-logical vocabulary) which makes the following sentences all true. (You may present the structure using either tables or a diagram.)

8. a = b, fb = fc, Pa, ¬ P(fa), Rab, ¬ Rbc, Rb(fb)

answer

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

9. Fa ∧ Ga

answer

Phi 270 F96 test 5 answers

1. Ned has visited a museum in Linden

(∃x: x is a museum in Linden) Ned has visited x

(∃x: x is a museum ∧ x is in Linden) Ned has visited x

(∃x: Mx ∧ Nxl) Vnx

∃x ((Mx ∧ Nxl) ∧ Vnx)

M: [_ is a museum]; N: [_ is in _]; V: [_ has visited _]; l: Linden; n: Ned

2. *general exemplification*

(∀x: x is a route) something blocked x

(∀x: Rx) ∃y y blocked x

(∀x: Rx) ∃y Byx

uniformly general exemplification

∃y y blocked each route

∃y (∀x: x is a route) y blocked x

∃y (∀x: Rx) Byx

B: [_ blocked _]; R: [_ is a route]

3. At most one plan was implemented

¬ at least two plans were implemented

¬ (∃x: x is a plan) (∃y: y is a plan ∧ ¬ y = x) (x was implemented ∧ y was implemented)

¬ (∃x: Px) (∃y: Py ∧ ¬ y = x) (Ix ∧ Iy)

I: [_ was implemented]; P: [_ is a plan]

4. *using Russell's analysis:*

the scout you saw is such that (he or she saw you)

(∃x: x and only x is a scout you saw) Sxo

(∃x: x is a scout you saw ∧ (∀y: ¬y = x) ¬ y is a scout you saw) Sxo

(∃x: (Tx ∧ Sox) ∧ (∀y: ¬y = x) ¬ (Ty ∧ Soy)) Sxo

using the description operator:

the scout you saw saw you

S(the scout you saw)o

S(ι x x is a scout you saw)o

S(ι x (x is a scout ∧ you saw x))o

S(ι x (Tx ∧ Sox))o

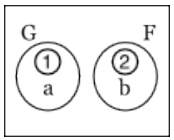
S: [_ saw _]; T: [_ is a scout]; o: you

5.

	∃x Rax	1
	∀x (∃y Ryx → Fx)	b:2
	ⓑ	
	Rab	(3)
2 UI	∃y Ryb → Fb	4
3 EG	∃y Ryb	X, (4)
4 MPP	Fb	(4)
5 EG	∃x Fx	X, (6)
	●	
6 QED	∃x Fx	1
1 PCh	∃x Fx	

6.

	∃x Fx	1
	Ga	(4)
	ⓑ	
	Fb	(6)
	∀x ¬ (Fx ∧ Gx)	a:3, b:5
3 UI	¬ (Fa ∧ Ga)	4
4 MPT	¬ Fa	
5 UI	¬ (Fb ∧ Gb)	6
6 MPT	¬ Gb	
	○	¬Fa, Fb, Ga, ¬Gb ⇏ ⊥
	⊥	2
2 NcP	∃x (Fx ∧ Gx)	1
1 PCh	∃x (Fx ∧ Gx)	



7. A sentence φ is entailed by a set Γ of sentences if and only if there is no possible world in which φ is false while each member of Γ is true.

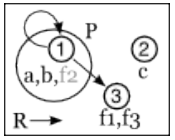
8. range: 1, 2, 3

a	b	c
1	1	3

τ	fτ
1	2
2	1
3	2

τ	Pτ
1	T
2	F
3	F

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



(The diagram 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		b: 1
fa	2	f1: 2
fb		f1: 2
fc		f3: 2
c	3	c: 3

resources	*values*
Pa	P1: **T**
¬ P(fa)	P2: **F**
Rab	R11: **T**
¬ Rbc	R13: **F**
Rb(fb)	R12: **T**

9. The following are 4 possibilities (up to choice of the variable) from which your two might be chosen; in the last, τ may be any term:

$[Fx \wedge Gx]_x a$

$[Fx \wedge Ga]_x a$

$[Fa \wedge Gx]_x a$

$[Fa \wedge Ga]_x \tau$