

Phi 270 Foo test 5 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. 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 $\lambda x (x \text{ was red nosed})$ 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. $\exists x (\forall y: Fy) Rxy$
 $(\forall x: Fx) \exists y Ryx$
[answer]

That is: *Something is relevant to all findings* \Rightarrow *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. $\exists x (\exists y: \neg y = x) Rxy$
 $\exists x \neg Rxx$
[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	$(A \vee \neg B) \wedge \neg (C \rightarrow D)$
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. $a = c, fc = b, d = e, Fc, Fd, \neg Fb, Rab, Rea, R(fa)b, \neg Re(fc)$
 [answer]
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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)*
 $\exists x$ *x is a yak that someone yoked*
 $\exists x (x \text{ is a yak} \wedge \text{someone yoked } x)$
 $\exists x (Yx \wedge \text{someone is such that (he or she yoked } x))$
 $\exists x (Yx \wedge (\exists y: y \text{ is a person}) y \text{ yoked } x)$
 $\exists x (Yx \wedge (\exists y: Py) Kyx)$
 $\exists x (Yx \wedge \exists y (Py \wedge Kyx))$
 [K: $\lambda xy (x \text{ yoked } y)$; P: $\lambda x (x \text{ is a person})$; Y: $\lambda x (x \text{ is a yak})$]
2. *first analysis:*

Each explorer mapped a route each explorer is such (he or she mapped a route)
 $(\forall x: x \text{ is an explorer}) x \text{ mapped a route}$
 $(\forall x: Ex) \text{some route is such that (x mapped it)}$
 $(\forall x: Ex) (\exists y: y \text{ is a route}) x \text{ mapped } y$
 $(\forall x: Ex) (\exists y: Ry) Mxy$

second analysis:

Each explorer mapped a route some route is st (each explorer mapped it)
 $(\exists x: x \text{ is a route}) \text{each explorer mapped } x$
 $(\exists x: Rx) \text{each explorer is such that (he or she mapped } x)$
 $(\exists x: Rx) (\forall y: y \text{ is an explorer}) y \text{ mapped } x$
 $(\exists x: Rx) (\forall y: Ey) Myx$

[P: $\lambda x (x \text{ is an explorer})$; M: $\lambda xy (x \text{ mapped } y)$; R: $\lambda x (x \text{ is a route})$]

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 \wedge \neg at least two reindeer were red nosed

some reindeer is such that (it was red nosed) \wedge \neg at least two reindeer were such that (they were red nosed)

$(\exists x: x \text{ is a reindeer}) x \text{ was red nosed} \wedge \neg (\exists x: x \text{ is a reindeer}) (\exists y: y \text{ is a reindeer} \wedge \neg y = x) (x \text{ was red nosed} \wedge y \text{ was red nosed})$

$(\exists x: Rx) Nx \wedge \neg (\exists x: Rx) (\exists y: Ry \wedge \neg y = x) (Nx \wedge Ny)$

or:

Exactly one reindeer was red nosed

some reindeer is such that (it was red nosed and no other reindeer was red nosed)

$(\exists x: x \text{ is a reindeer}) (x \text{ was red nosed and no other reindeer was red nosed})$

$(\exists x: Rx) (Nx \wedge \textit{no reindeer other than } x \textit{ was red nosed})$
 $(\exists x: Rx) (Nx \wedge \textit{no reindeer other than } x \textit{ is such that (it was red nosed)})$
 $(\exists x: Rx) (Nx \wedge (\forall y: y \textit{ is a reindeer} \wedge \neg y = x) \neg y \textit{ was red nosed})$
 $(\exists x: Rx) (Nx \wedge (\forall y: Ry \wedge \neg y = x) \neg Ny)$

or:

$(\exists x: Rx) (Nx \wedge (\forall y: Ry \wedge Ny) x = y)$

[N: λx (x *was red nosed*); R: λx (x *is a reindeer*)]

The generalization using the variable y must be restricted 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)

$(\exists x: x \textit{ and only } x \textit{ is a fireplace}) \textit{ Santa gained entry through } x$

$(\exists x: x \textit{ is a fireplace} \wedge (\forall y: \neg y = x) \neg y \textit{ is a fireplace}) Gsx$

$(\exists x: Fx \wedge (\forall y: \neg y = x) \neg Fy) Gsx$

or:

$(\exists x: Fx \wedge (\forall y: Fy) x = y) Gsx$

using the description operator:

Santa gained entry through the fireplace

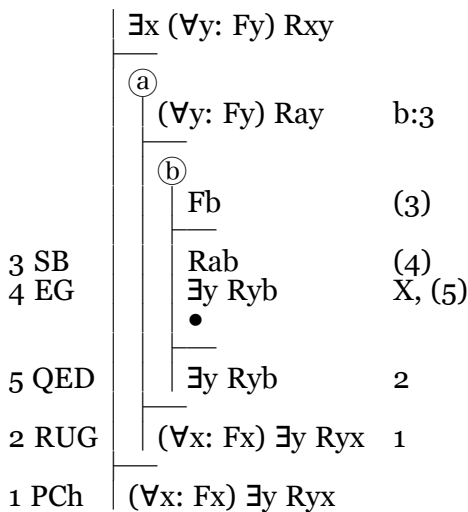
G s (*the fireplace*)

G s (ιx x *is a fireplace*)

Gs(ιx Fx)

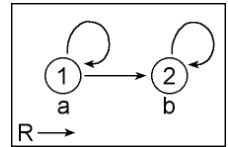
[F: λx (x *is a fireplace*); G: λxy (x *gained entry through* y); s: *Santa*]

5.



6.

	$\exists x (\exists y: \neg y = x) Rxy$	
	(a)	
	($\exists y: \neg y = a$) Ray	
	(b)	
	$\neg b = a$	
	Rab	
	$\forall x Rxx$	a:4,b:5
	Raa	
4 UI	Rbb	
5 UI	○	
	\perp	$\neg b = a, Rab, Raa, Rbb \Rightarrow \perp$
		3
3 NcP	$\exists x \neg Rxx$	2
2 PRCh	$\exists x \neg Rxx$	1
1 PCh	$\exists x \neg Rxx$	



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		$(A \vee \neg B) \wedge \neg (C \rightarrow D)$
T	F	T	F		T T \textcircled{T} T F

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

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
$\neg Fb$	F2: F
Rab	R12: T
Rea	R31: T
R(fa)b	R22: T
$\neg Re(fc)$	R32: F

range: 1, 2, 3

a	b	c	d	e	τ	f τ	τ	F τ	R	1	2	3
1	2	1	3	3	1	2	1	T	1	F	T	F
					2	2	2	F	2	F	T	F
					3	3	3	T	3	T	F	F

