

Phi 270 F05 test 4

Analyze the sentences below in as much detail as possible, providing a key to the non-logical vocabulary you use. *Restate 1 using an unrestricted quantifier.*

1. **Everyone knew the tune.** [Remember to restate your answer to this using an unrestricted quantifier.]

answer

2. **Sam heard only tunes that he knew.**
[Remember to restate your answer in 2 using an unrestricted quantifier.]

answer

3. **No one liked everything on the menu.**

answer

Synthesize an English sentence with the following logical form; that is, produce a sentence that would have the following analysis:

4. $(\forall x: Px) \rightarrow Fsx$

P: [is a person]; F: [fit]; s: the shoe

answer

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

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

answer

6. $\frac{\forall x \forall y (Gy \rightarrow Rxy)}{\forall x (Fx \rightarrow Gx)}$

answer

answer

Use a derivation to show that the following argument is not valid and present a counterexample by describing a structure that divides an open gap. (You may describe the structure either by depicting it in a diagram, as answers in the text usually do, or by giving tables.)

7. $\frac{\forall x (Fx \rightarrow Rax)}{Fa}$

answer

answer

answer

Phi 270 F05 test 4 answers

1. **Everyone knew the tune**
Everyone is such that (he or she knew the tune)
 $(\forall x: \underline{x} \text{ is a person}) \underline{x} \text{ knew the tune}$

$(\forall x: Px) Kxt$

$\forall x (P \rightarrow Kxt)$

K: [knew]; P: [is a person]; t: the tune

2. **Sam heard only tunes that he knew**
only tunes that Sam knew are such that (Sam heard them)

$(\forall x: \neg x \text{ is a tune that Sam knew}) \rightarrow \text{Sam heard } \underline{x}$

$(\forall x: \neg (x \text{ is a tune} \wedge \text{Sam knew } \underline{x})) \rightarrow Hsx$

$(\forall x: \neg (Tx \wedge Ksx)) \rightarrow Hsx$

[heard]; K: [knew]; T: [is a tune]; s: Sam

A different but equally plausible interpretation would be to treat tunes as a bounds indicator; this interpretation would be analyzed as $(\forall x: Tx \wedge \neg Ksx) \rightarrow Hsx$. This is also the analysis of **Sam heard no tunes he didn't know.**

3. **No one liked everything on the menu**
No one is such that (he or she liked everything on the menu)

$(\forall x: \underline{x} \text{ is a person}) \neg x \text{ liked everything on the menu}$

$(\forall x: Px) \neg \text{everything on the menu is such that } (x \text{ liked it})$

$(\forall x: Px) \neg (\forall y: \underline{y} \text{ is on the menu}) \underline{x} \text{ liked } \underline{y}$

$(\forall x: Px) \neg (\forall y: Oym) Lxy$

L: [liked]; O: [is on]; P: [is a person]; m: the menu

4. $(\forall x: x \text{ is a person}) \neg \text{the shoe fit } x$
No one is such that (the shoe fit him or her)

The shoe fit no one

or

$(\forall x: x \text{ is a person}) \neg \text{the shoe fit } x$

$(\forall x: x \text{ is a person}) \text{the shoe didn't fit } x$

Everyone is such that (the shoe didn't fit him or her)

The shoe didn't fit anyone

The sentence **The shoe didn't fit everyone** is not the best synthesis since it is likely to be understood as the denial of **The shoe fit everyone**—i.e., as $\neg (\forall x: Px) Fsx$.

5.

	$\forall x (Fx \wedge Gx)$ a:2	
2 UI	(a) $Fa \wedge Ga$ 3	
3 Ext	Fa (6)	
3 Ext	Ga (5)	
	•	
5 QED	Ga 4	
	•	
6 QED	Fa 4	
4 Cnj	$Ga \wedge Fa$ 1	
1 UG	$\forall x (Gx \wedge Fx)$	

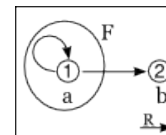
6.

	$\forall x \forall y (Gy \rightarrow Rxy)$ b:6	
	$\forall x (Fx \rightarrow Gx)$ a:4	
	(a) Fa (5)	
	(b)	
4 UI	$Fa \rightarrow Ga$ 5	
5 MPP	Ga (8)	
6 UI	$\forall y (Gy \rightarrow Rby)$ a: 7	
7 UI	$Ga \rightarrow Rba$ 8	
8 MPP	Rba (9)	
	•	
9 QED	Rba 3	
3 UG	$\forall y Rya$ 2	
2 CP	$Fa \rightarrow \forall y Rya$ 1	
1 UG	$\forall x (Fx \rightarrow \forall y Ryx)$	

7.

	$\forall x (Fx \rightarrow Rax)$ a:1, b:4	
	Fa (2)	
1 UI	$Fa \rightarrow Raa$ 2	
2 MPP	Raa	
	(b)	
4 UI	$Fb \rightarrow Rab$ 6	
	$\neg Rba$	
	$\neg Fb$	
	○ $Fa, Raa, \neg Rba, \neg Fb \Rightarrow \perp$	
	\perp 7	
7 IP	Fb 6	
	Rab	
	○ $Fa, Raa, \neg Rba, Rab \Rightarrow \perp$	
	\perp 6	
6 RC	\perp 5	
5 IP	Rba 3	
3 UG	$\forall x Rxa$	

Counterexample presented by a diagram



Counterexample presented by tables

range: 1, 2	a	b	τ	$F\tau$	R	1	2
	1	2	1	T	1	T	T
	2	1	2	F	2	F	F

This counterexample divides both gaps; but the specific value for F2 is needed only for the first gap and the specific value for R12 is needed only for the second.

Phi 270 Fo4 test 4

Analyze the sentences below in as much detail as possible, providing a key to the non-logical vocabulary you use. *Restate 2 using an unrestricted quantifier.*

1. Sam checked every lock

answer

2. No one who was in the office answered the call

[Remember to restate your answer in 2 using an unrestricted quantifier.]

answer

3. Ralph got the joke if anyone did

answer

4. Only bestsellers were on every list

answer

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

5. $\forall x Fx$
 $\forall x \neg Gx$

$\forall x (Fx \wedge \neg Gx)$

answer

6. $\forall x (Rxa \rightarrow \forall y Txy)$

$\forall x \forall y (Rya \rightarrow Tyx)$

answer

Use a derivation to show that the following argument is not valid and present a counterexample by describing a structure that divides an open gap. (You may describe the structure either by depicting it in a diagram, as answers in the text usually do, or by giving tables.)

7. $\forall x Rax$
 $\forall x (Rxa \rightarrow Rxx)$

answer

Phi 270 Fo4 test 4 answers

1. Sam checked every lock

Every lock is such that (Sam checked it)

$(\forall x: x \text{ is a lock}) \text{ Sam checked } x$

$(\forall x: Lx) Csx$

C: [_ checked _]; L: [_ is a lock]; s: Sam

2. No one who was in the office answered the call

No one who was in the office is such that (he or she answered the call)

$(\forall x: x \text{ is a person who was in the office}) \neg x \text{ answered the call}$

$(\forall x: x \text{ is a person} \wedge x \text{ was in the office}) \neg Axc$

$(\forall x: Px \wedge Nxo) \neg Axc$

$\forall x ((Px \wedge Nxo) \rightarrow \neg Axc)$

A: [_ answered _]; P: [_ is a person]; N: [_ was in _]; c: the call; o: the office

3. Ralph got the joke if anyone did

Everyone is such that (Ralph got the joke if he or she did)

$(\forall x: x \text{ is a person}) \text{ Ralph got the joke if } x \text{ did}$

$(\forall x: Px) (\text{Ralph got the joke} \leftarrow x \text{ got the joke})$

$(\forall x: Px) (Grj \leftarrow Gxj)$

$(\forall x: Px) (Gxj \rightarrow Grj)$

P: [_ is a person]; G: [_ got _]; j: the joke

4. Only bestsellers were on every list

Only bestsellers are such that (they were on every list)

$(\forall x: \neg x \text{ is a bestseller}) \neg x \text{ was on every list}$

$(\forall x: \neg Bx) \neg \text{every list is such that } (x \text{ was on it})$

$(\forall x: \neg Bx) \neg (\forall y: y \text{ is a list}) x \text{ was on } y$

$(\forall x: \neg Bx) \neg (\forall y: Ly) Nxy$

B: [_ is a bestseller]; L: [_ is a list]; N: [_ was on _]

- 5.
- | | | | | | | | |
|---------------------|---|---------------------|-----|-----|---|--|--|
| $\forall x Fx$ | a: 3 | | | | | | |
| $\forall x \neg Gx$ | a: 5 | | | | | | |
| 3 UI | <table style="border-collapse: collapse;"> <tr> <td style="border-left: 1px solid black; padding-left: 5px;">(a)</td> <td style="padding-left: 5px;">Fa</td> <td style="padding-left: 20px;">(4)</td> </tr> <tr> <td style="border-left: 1px solid black; padding-left: 5px;">•</td> <td></td> <td></td> </tr> </table> | (a) | Fa | (4) | • | | |
| (a) | Fa | (4) | | | | | |
| • | | | | | | | |
| 4 QED | <table style="border-collapse: collapse;"> <tr> <td style="border-left: 1px solid black; padding-left: 5px;">Fa</td> <td style="padding-left: 20px;">2</td> </tr> </table> | Fa | 2 | | | | |
| Fa | 2 | | | | | | |
| 5 UI | <table style="border-collapse: collapse;"> <tr> <td style="border-left: 1px solid black; padding-left: 5px;">$\neg Ga$</td> <td style="padding-left: 20px;">(6)</td> </tr> <tr> <td style="border-left: 1px solid black; padding-left: 5px;">•</td> <td></td> </tr> </table> | $\neg Ga$ | (6) | • | | | |
| $\neg Ga$ | (6) | | | | | | |
| • | | | | | | | |
| 6 QED | <table style="border-collapse: collapse;"> <tr> <td style="border-left: 1px solid black; padding-left: 5px;">$\neg Ga$</td> <td style="padding-left: 20px;">2</td> </tr> </table> | $\neg Ga$ | 2 | | | | |
| $\neg Ga$ | 2 | | | | | | |
| 2 Cnj | <table style="border-collapse: collapse;"> <tr> <td style="border-left: 1px solid black; padding-left: 5px;">$Fa \wedge \neg Ga$</td> <td style="padding-left: 20px;">1</td> </tr> </table> | $Fa \wedge \neg Ga$ | 1 | | | | |
| $Fa \wedge \neg Ga$ | 1 | | | | | | |
| 1 UG | $\forall x (Fx \wedge \neg Gx)$ | | | | | | |

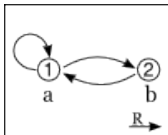
6. $\forall x (Rxa \rightarrow \forall y Txy)$ c:4

	(b)		
	(c)	Rca	(5)
4 UI		Rca $\rightarrow \forall y Tcy$	5
5 MPP		$\forall y Tcy$	b: 6
6 UI		Tcb	(7)
		•	
7 QED		Tcb	3
		Rca \rightarrow Tcb	2
3 CP		$\forall y (Rya \rightarrow Tyb)$	1
2 UG		$\forall x \forall y (Rya \rightarrow Tyx)$	
1 UG			

7. $\forall x Rax$ a:4, b:5

	(b)		
		Rba	
		$\neg Rbb$	
4 UI		Raa	
5 UI		Rab	
		o	Rba, $\neg Rbb$, Raa, Rab $\Rightarrow \perp$
		\perp	3
3 IP		Rbb	2
2 CP		Rba \rightarrow Rbb	1
1 UG		$\forall x (Rxa \rightarrow Rxx)$	

Counterexample presented by a diagram



Counterexample presented by tables

range: 1, 2	a	b	R	1	2
	1	2		T	T
				T	F

Phi 270 F03 test 4

Analyze the sentences below in as much detail as possible, providing a key to the non-logical vocabulary you use. *Restate 2 using an unrestricted quantifier.*

- No one called the new number
answer
- Sam asked everyone he could think of [Remember to restate this one using an unrestricted quantifier.]
answer
- If any door was opened, the alarm sounded
answer
- Only people who'd read everything the author had written were asked to review the book
answer

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

- $\forall x (Fx \wedge Gx)$
 $\forall x Gx$
answer
- $\forall x (Fx \rightarrow Gx)$
 $\forall x \forall y (Gy \rightarrow Rxy)$
 $\forall x \forall y (Fy \rightarrow Rxy)$
answer

Use a derivation to show that the following argument is not valid and describe a structure (by using either a diagram or tables) that divides an open gap.

- $\forall x (Fx \rightarrow Rxa)$
 $Fa \rightarrow \forall x Rxx$
answer

Phi 270 F03 test 4 answers

- No one called the new number
No one is such that (he or she called the new number)
($\forall x: x$ is a person) \neg x called the new number)
($\forall x: Px$) \neg Cxn
C: [_ called _]; P: [_ is a person]; n: the new number

2. Sam asked everyone he could think of everyone Sam could think of is such that (Sam asked him or her)

$(\forall x: x \text{ is a person Sam could think of}) \text{ Sam asked } x$

$(\forall x: x \text{ is a person} \wedge \text{ Sam could think of } x) \text{ Asx}$

$(\forall x: Px \wedge Tsx) \text{ Asx}$

$\forall x ((Px \wedge Tsx) \rightarrow \text{Asx})$

A: [_ asked _]; P: [_ is a person]; T: [_ could think of _]; s: Sam

3. If any door was opened, the alarm sounded every door is such that (if it was opened, the alarm sounded) $(\forall x: x \text{ is a door})$ if x was opened, the alarm sounded

$(\forall x: Dx) (x \text{ was opened} \rightarrow \text{the alarm sounded})$

$(\forall x: Dx) (Ox \rightarrow Sa)$

D: [_ is a door]; O: [_ was opened]; S: [_ sounded]; a: the alarm

4. Only people who'd read everything the author had written were asked to review the book

Only people who'd read everything the author had written are such that (they were asked to review the book)

$(\forall x: \neg x \text{ is a person who'd read everything the author had written}) \neg x \text{ was asked to review the book}$

$(\forall x: \neg (x \text{ is a person} \wedge x \text{ had read everything the author had written})) \neg \text{Axb}$

$(\forall x: \neg (x \text{ is a person} \wedge \text{everything the author had written is such that } (x \text{ had read it}))) \neg \text{Axb}$

$(\forall x: \neg (Px \wedge (\forall y: y \text{ is a thing the author had written}) x \text{ had read } y)) \neg \text{Axb}$

$(\forall x: \neg (Px \wedge (\forall y: \text{the author had written } y) Rxy)) \neg \text{Axb}$

$(\forall x: \neg (Px \wedge (\forall y: \text{Way}) Rxy)) \neg \text{Axb}$

A: [_ was asked to review _]; P: [_ is a person]; R: [_ had read _]; R: [_ had written _]; a: the author; b: the book

5.

1 UG	$\forall x (Fx \wedge Gx)$	a: 2
2 UI	(a)	
3 Ext	Fa \wedge Ga	3
3 Ext	Fa	
	Ga	(4)
	•	
4 QED	Ga	1
1 UG	$\forall x Gx$	

6.

	$\forall x (Fx \rightarrow Gx)$	b:4
	$\forall x \forall y (Gy \rightarrow Rxy)$	a:6
	(a)	
	(b)	
	Fb	(5)
4 UI	Fb \rightarrow Gb	5
5 MPP	Gb	(8)
6 UI	$\forall y (Gy \rightarrow Ray)$	b:7
7 UI	Gb \rightarrow Rab	8
8 MPP	Rab	(9)
	•	
9 QED	Rab	3
3 CP	Fb \rightarrow Rab	2
2 UG	$\forall y (Fy \rightarrow Ray)$	1
1 UG	$\forall x \forall y (Fy \rightarrow Rxy)$	

7.

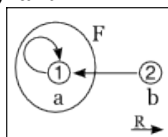
	$\forall x (Fx \rightarrow Rxa)$	a:2, b:5
	Fa	(3)
2 UI	Fa \rightarrow Raa	3
3 MPP	Raa	
	(b)	
5 UI	Fb \rightarrow Rba	7
	\neg Rbb	
	\neg Fb	
	\circ	Fa, Raa, \neg Rbb, \neg Fb $\Rightarrow \perp$
	\perp	8
8 IP	Fb	7
	Rba	
	\circ	Fa, Raa, \neg Rbb, Rba $\Rightarrow \perp$
	\perp	7
7 RC	\perp	6
6 IP	Rbb	4
4 UG	$\forall x Rxx$	1
1 CP	Fa $\rightarrow \forall x Rxx$	

Counterexample presented by tables

range: 1, 2	a b	τ F τ	R	1	2
	1 2	1 T	1	T	F
		2 F	2	T	F

(This interpretation divides both gaps; the value of F2 is needed only for the 1st and the value of R21 only for the 2nd.)

Counterexample presented by a diagram



Phi 270 Fo2 test 4

Analyze the sentences below in as much detail as possible, providing a key to the non-logical vocabulary you use. *Notice the special instructions for 2.*

1. Only bears performed.

answer

2. If everyone cheered, the elephant bowed. [In this case, restate your answer using an unrestricted quantifier.]

answer

3. No one laughed at any performers except clowns.

answer

Synthesize an English sentence with the following logical form:

4. $(\forall x: Px \wedge Cxt) Ctx$

C: [_ called _]; P: [_ is a person]; t: Tom

answer

Use derivations to establish the validity of the following arguments. You may use attachment rules.

5. $\forall x Fx$

$\forall x \neg (Fx \wedge Gx)$

$\forall x \neg Gx$

answer

6. $\forall x \forall y (Fy \rightarrow Rxy)$

$\forall x (Fx \rightarrow \forall y Ryx)$

answer

Use a derivation to show that the following argument is not valid and describe a structure (by using either a diagram or tables) that divides one of the derivation's open gaps.

7. $\forall x Rax$

$\forall x (Rbx \rightarrow \neg Rxa)$

$\forall x \neg Rbx$

answer

Phi 270 Fo2 test 4 answers

1. Only bears performed

$(\forall x: \neg x \text{ is a bear}) \neg x \text{ performed}$

$(\forall x: \neg Bx) \neg Px$

B: [_ is a bear]; P: [_ performed]

2. If everyone cheered, the elephant bowed
 everyone cheered \rightarrow the elephant bowed
 $(\forall x: x \text{ is a person}) x \text{ cheered} \rightarrow \text{the elephant bowed}$

$$(\forall x: Px) Cx \rightarrow Be$$

$$\forall x (Px \rightarrow Cx) \rightarrow Be$$

B: x bowed; C: x cheered; P: x is a person; e: the elephant

Incorrect:

$$(\forall x: Px) (Cx \rightarrow Be) \text{ or: } \forall x (Px \rightarrow (Cx \rightarrow Be))$$

these say: If anyone cheered, the elephant bowed

3. No one laughed at any performers except clowns
 all performers except clowns are such that (no one laughed at them)

$(\forall x: x \text{ is a performer} \wedge \neg x \text{ is a clown})$ no one laughed at x

$(\forall x: x \text{ is a performer} \wedge \neg x \text{ is a clown}) (\forall y: y \text{ is a person}) \neg y$
 laughed at x

$$(\forall x: Fx \wedge \neg Cx) (\forall y: Py) \neg Lyx$$

C: [_ is a clown]; F: [_ is a performer]; P: [_ is a person]; L: [_
 laughed at _]

Incorrect:

$$(\forall y: Py) \neg (\forall x: Fx \wedge \neg Cx) Lyx$$

says: No one laughed at all performers who weren't clowns

4. $(\forall x: x \text{ is a person} \wedge x \text{ called Tom})$ Tom called x
 $(\forall x: x \text{ is a person who called Tom})$ Tom called x
 everyone who called Tom is such that (Tom called him or her)
 Tom called everyone who called him

	$\forall x Fx$	a:2
	$\forall x \neg (Fx \wedge Gx)$	a:3
	ⓐ	
2 UI	Fa	(4)
3 UI	$\neg (Fa \wedge Ga)$	4
4 MPT	$\neg Ga$	(5)
	•	
	—	
5 QED	$\neg Ga$	1
1 UG	$\forall x \neg Gx$	

	$\forall x \forall y (Fy \rightarrow Rxy)$	b:4
	ⓐ	
	Fa	(6)
	ⓑ	
4 UI	$\forall y (Fy \rightarrow Rby)$	a:5
5 UI	Fa \rightarrow Rba	6
6 MPP	Rba	(7)
	•	
	—	
7 QED	Rba	3
	—	
3 UG	$\forall y Rya$	2
	—	
2 CP	Fa $\rightarrow \forall y Rya$	1
1 UG	$\forall x (Fx \rightarrow \forall y Ryx)$	

7. $\forall x Rax$ a:3,b:4,c:5
 $\forall x (Rbx \rightarrow \neg Rxa)$ c:6,a:8,b:10

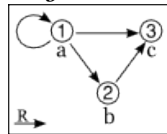
	(C)		
		Rbc	(7)
		—	
3 UI		Raa	(9)
4 UI		Rab	
5 UI		Rac	
6 UI		$Rbc \rightarrow \neg Rca$	7
7 MPP		$\neg Rca$	
8 UI		$Rba \rightarrow \neg Raa$	9
9 MTT		$\neg Rba$	
10 UI		$Rbb \rightarrow \neg Rba$	11
		$\neg Rbb$	
		—	
		○	$Rbc, Raa, Rab, Rac, \neg Rca, \neg Rba, \neg Rbb \Rightarrow \perp$
		—	
		\perp	12
		—	
12 IP		Rbb	11
		$\neg Rba$	
		—	
		○	$Rbc, Raa, Rab, Rac, \neg Rca, \neg Rba \Rightarrow \perp$
		—	
		\perp	11
		—	
11 RC		\perp	2
		—	
2 RAA		$\neg Rbc$	1
		—	
1 UG		$\forall x \neg Rbx$	

Counterexample presented by tables

range: 1, 2, 3	a b c	R	1	2	3
	1 2 3	1	T	T	T
		2	F	F	T
		3	F	F	F

Grayed values are not required to divide either gap; the value for R22 is not required to divide the 2nd gap

Counterexample presented by a diagram



Phi 270 Foo test 4

Analyze the sentences below in as much detail as possible, providing a key to the non-logical vocabulary you use. *Notice the special instructions for 2.*

1. **Only necessary projects were funded.** [Different interpretations of the scope of *only* are possible here; any of them will do.]
2. **Tom can solve the puzzle if anyone can.** [In this case, restate your answer using an unrestricted quantifier.]
3. **No one received every vote**

Use derivations to establish the validity of the following arguments. You may use attachment rules. English interpretations are suggested but remember that they play no role in derivations, and don't hesitate to ignore them if they don't help you think about the derivations.

4. $\forall x (Dx \rightarrow Mx)$
 $\forall x (\neg Ax \rightarrow \neg Mx)$

 $\forall x (Dx \rightarrow Ax)$

A: [is an animal]; D: [is dog]; M: [is a mammal]

5. $\forall x \forall y ((Py \wedge Byx) \rightarrow Dxy)$

 $\forall x (Px \rightarrow \forall y (Bxy \rightarrow Dxy))$

Everyone who has built anything is proud of it / Everyone is proud of everything he or she has built

6. Use a derivation to show that the following argument is not valid and describe a structure (by using either a diagram or tables) that divides one of the derivation's open gaps.

$\forall x (Rxx \rightarrow \neg Fx)$
 $\forall x Rxc$

 $\forall x \forall y (Fy \rightarrow \neg Rxy)$

Phi 270 Foo test 4 answers

1. Only necessary projects were funded

$(\forall x: \neg x \text{ was a necessary project}) \rightarrow x \text{ was funded}$

$(\forall x: \neg (x \text{ was a project} \wedge x \text{ was necessary})) \rightarrow x \text{ was funded}$

$(\forall x: \neg (Px \wedge Nx)) \rightarrow Fx$

or: $(\forall x: Px \wedge \neg Nx) \rightarrow Fx$ —i.e., **No unnecessary projects were funded;**

or: $(\forall x: Nx \wedge \neg Px) \rightarrow Fx$ —i.e., **Among the necessities only projects were funded**

F: [_ was funded]; N: [_ was necessary]; P: [_ was a project]

2. Tom can solve the puzzle if anyone can

$(\forall x: x \text{ is a person}) \text{ Tom can solve the puzzle if } x \text{ can}$

$(\forall x: Px) (\text{Tom can solve the puzzle} \leftarrow x \text{ can solve the puzzle})$

$(\forall x: Px) (S \text{ Tom the puzzle} \leftarrow S x \text{ the puzzle})$

$(\forall x: Px) (Stp \leftarrow Sxp) [or: (\forall x: Px) (Sxp \rightarrow Stp)]$

$\forall x (Px \rightarrow (Stp \leftarrow Sxp)) [or: \forall x (Px \rightarrow (Sxp \rightarrow Stp))]$

P: [_ is a person]; S: [_ can solve _]; p: the puzzle; t: Tom

3. No one received every vote

$(\forall x: x \text{ is a person}) \rightarrow x \text{ received every vote}$

$(\forall x: Px) \rightarrow x \text{ received every vote}$

$(\forall x: Px) \rightarrow (\forall y: y \text{ is a vote}) x \text{ received } y$

$(\forall x: Px) \rightarrow (\forall y: Vy) Rxy$

P: [_ is a person]; R: [_ received _]; V: [_ is a vote]

Incorrect answers:

$(\forall x: Px) (\forall y: Vy) \rightarrow Rxy$ says **No one received any vote**

$\neg (\forall x: Px) (\forall y: Vy) Rxy$ says **Not everyone received every vote**

$(\forall y: Vy) \neg (\forall x: Px) Rxy$ says **No vote is such that everyone received it**

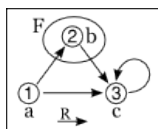
4•	$\forall x (Dx \rightarrow Mx)$	a:3
	$\forall x (\neg Ax \rightarrow \neg Mx)$	a:5
	ⓐ	
	Da	(4)
	┌	
3 UI	Da \rightarrow Ma	4
4 MPP	Ma	(6)
5 UI	$\neg Aa \rightarrow \neg Ma$	6
6 MTT	Aa	(7)
	•	
	┌	
7 QED	Aa	2
	┌	
2 CP	Da \rightarrow Aa	1
	┌	
1 UG	$\forall x (Dx \rightarrow Ax)$	

5•	$\forall x \forall y ((Py \wedge Byx) \rightarrow Dyx)$	b:5
	ⓐ	
	Pa	(9)
	┌	
	ⓑ	
	Bab	(10)
	┌	
5 UI	$\forall y ((Py \wedge Byb) \rightarrow Dyb)$	a:6
6 UI	(Pa \wedge Bab) \rightarrow Dab	8
	┌	
	\neg Dab	(8)
	┌	
8 MTT	$\neg (Pa \wedge Bab)$	9
9 MPT	\neg Bab	(10)
	┌	
10 Nc	\perp	7
	┌	
7 IP	Dab	4
	┌	
4 CP	Bab \rightarrow Dab	3
	┌	
3 UG	$\forall y (Bay \rightarrow Day)$	2
	┌	
2 CP	Pa $\rightarrow \forall y (Bay \rightarrow Day)$	1
	┌	
1 UG	$\forall x (Px \rightarrow \forall y (Bxy \rightarrow Dxy))$	

[This can be done without the *reductio* argument begun at stage 7 by using Adj to derive Pa \wedge Bab in order to exploit (Pa \wedge Bab) \rightarrow Dab for a]

6.

	$\forall x (R_{xx} \rightarrow \neg Fx)$	b:4, c:9, a:11
	$\forall x R_{xc}$	a:6, b:7, c:8
	(a)	
	(b)	
	Fb	(5)
4 UI	Rbb $\rightarrow \neg Fb$	5
5 MTT	$\neg Rbb$	
6 UI	Rac	
7 UI	Rbc	
8 UI	Rcc	(10)
9 UI	Rcc $\rightarrow \neg Fc$	10
10 MPP	$\neg Fc$	
11 UI	Raa $\rightarrow \neg Fa$	13
	Rab	
	$\neg Raa$	
	o	Fb, $\neg Rbb, Rac, Rbc, Rcc, \neg Fc, Rab, \neg Raa \Rightarrow \perp$
	\perp	14
14 IP	Raa	13
	$\neg Fa$	
	o	Fb, $\neg Rbb, Rac, Rbc, Rcc, \neg Fc, Rab, \neg Fa \Rightarrow \perp$
	\perp	13
13 RC	\perp	12
12 RAA	$\neg Rab$	3
3 CP	Fb $\rightarrow \neg Rab$	2
2 UG	$\forall y (Fy \rightarrow \neg Ray)$	1
1 UG	$\forall x \forall y (Fy \rightarrow \neg Rxy)$	



divides both open gaps

Phi 270 F99 test 4

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.

- Sam invited every vertebrate to the party, but only people accepted his invitation
answer
- Tom didn't send anything to the printer
answer
- No game that every child liked was complete
answer

Synthesize an English sentence whose analysis would yield the following form.

- $(\forall x: Px) (\forall y: Ry \wedge Txy) Sy$
P: [_ is a person]; R: [_ is a room]; S: [_ was reserved]; T: [_ thought of _]
answer

Use derivations to establish the validity of the following arguments. You may use attachment rules.

- $\forall x (Fx \rightarrow Gx)$
 $\forall x Fx \rightarrow \forall x Gx$
answer
- $\forall x \forall y (Fyx \rightarrow \neg Py)$
 $\forall x (Px \rightarrow \forall y \neg Fxy)$
answer
- Use a derivation to show that the following argument is not valid and describe a structure (by using either a diagram or tables) that divides one of the derivation's open gaps.
 $\forall x \forall y (Fy \rightarrow \neg Rxy)$
 $\forall x R_{xx}$
 $\forall x \forall y \neg Rxy$
answer

Phi 270 F99 test 4 answers

1. Sam invited every vertebrate to the party, but only people accepted his invitation

Sam invited every vertebrate to the party \wedge only people accepted Sam's invitation

every vertebrate is such that (Sam invited it to the party) \wedge only people are such that (they accepted Sam's invitation)

$(\forall x: x \text{ is a vertebrate}) \text{ Sam invited } x \text{ to the party} \wedge (\forall x: \neg x \text{ is a person}) \neg x \text{ accepted Sam's invitation}$

$(\forall x: Vx) \text{ Isxp} \wedge (\forall x: \neg Px) \neg Ax(\text{Sam's invitation})$
 $(\forall x: Vx) \text{ Isxp} \wedge (\forall x: \neg Px) \neg Ax(\text{is})$

A: [_ accepted _]; I: [_ invited _ to _]; P: [_ is a person];
 V: [_ is a vertebrate]; i: [_ 's invitation]; p: the party; s: Sam

2. Tom didn't send anything to the printer everything is such that (Tom didn't send it to the printer)

$\forall x$ Tom didn't send x to the printer

$\forall x \neg \text{Tom sent } x \text{ to the printer}$
 $\forall x \neg \text{Stxp}$

S: [_ sent _ to _]; p: the printer; t: Tom

3. No game that every child liked was complete
 No game that every child liked is such that (it was complete)

$(\forall x: x \text{ was a game that every child liked}) \neg x \text{ was complete}$

$(\forall x: x \text{ was a game} \wedge \text{every child liked } x) \neg Cx$

$(\forall x: x \text{ was a game} \wedge \text{every child is such that (he or she liked } x)) \neg Cx$

$(\forall x: Gx \wedge (\forall y: y \text{ was a child}) y \text{ liked } x) \neg Cx$
 $(\forall x: Gx \wedge (\forall y: Dy) Lyx) \neg Cx$

C: [_ was complete]; D: [_ was a child]; G: [_ was a game];

L: [_ liked _]

4. $(\forall x: x \text{ is a person}) (\forall y: y \text{ is a room} \wedge x \text{ thought of } y) y \text{ was reserved}$

$(\forall x: x \text{ is a person}) (\forall y: y \text{ is a room } x \text{ thought of}) y \text{ was reserved}$

$(\forall x: x \text{ is a person}) \text{ every room } x \text{ thought of was such that (it was reserved)}$

$(\forall x: x \text{ is a person}) \text{ every room } x \text{ thought of was reserved}$
 everyone is such that (every room he or she thought of was reserved)

every room anyone thought of was reserved

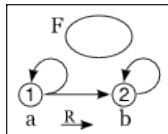
5.	$\forall x (Fx \rightarrow Gx)$	a:3
	$\forall x Fx$	a:4
	(a)	
3 UI	$Fa \rightarrow Ga$	5
4 UI	Fa	(5)
5 MPP	Ga	(6)
	•	
6 QED	Ga	2
2 UG	$\forall x Gx$	1
1 CP	$\forall x Fx \rightarrow \forall x Gx$	

6.	$\forall x \forall y (Fyx \rightarrow \neg Py)$	b:5
	(a)	
	Pa	(8)
	(b)	
	Fab	(7)
5 UI	$\forall y (Fyb \rightarrow \neg Py)$	a:6
6 UI	$Fab \rightarrow \neg Pa$	7
7 MPP	$\neg Pa$	(8)
	•	
8 Nc	\perp	4
4 RAA	$\neg Fab$	3
3 UG	$\forall y \neg Fay$	2
2 CP	$Pa \rightarrow \forall y \neg Fay$	1
1 UG	$\forall x (Px \rightarrow \forall y \neg Fxy)$	

7.

	$\forall x \forall y (Fy \rightarrow \neg Rxy)$	a:4,b:5
	$\forall x Rxx$	a:6,b:7
	(a)	
	(b)	
	Rab	(11)
4 UI	$\forall y (Fy \rightarrow \neg Ray)$	a:8, b:9
5 UI	$\forall y (Fy \rightarrow \neg Rby)$	a:12, b:13
6 UI	Raa	(10)
7 UI	Rbb	(14)
8 UI	$Fa \rightarrow \neg Raa$	10
9 UI	$Fb \rightarrow \neg Rab$	11
10 MTT	$\neg Fa$	
11 MTT	$\neg Fb$	
12 UI	$Fa \rightarrow \neg Rba$	15
13 UI	$Fb \rightarrow \neg Rbb$	14
14 MTT	$\neg Fb$	
	$\neg Fa$	
	o	$\neg Fa, \neg Fb, Rab, Raa, Rbb \Rightarrow \perp$
	\perp	16
16 IP	Fa	15
	$\neg Rba$	
	o	$\neg Fa, \neg Fb, Rab, Raa, Rbb, \neg Rba \Rightarrow \perp$
	\perp	15
15 RC	\perp	3
3 RAA	$\neg Rab$	2
2 UI	$\forall y \neg Ray$	1
1 UI	$\forall x \forall y \neg Rxy$	

The structure below divides both gaps



Phi 270 F98 test 4

(questions 1-2 are from quiz 4 and 3-8 are from quiz 5 out of 6 quizzes—these two quizzes addressed the part of the course your test is designed to cover)

- Identify individual terms and quantifier phrases in the following sentence and indicate links between pronouns and their antecedents. (You can do this by marking up an English sentence; you are *not* being asked to provide a symbolic analysis.)

Sam ordered a book, but instead of it he received a book he didn't want.

answer

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

No one saw the book that was lying on the table.

answer

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.

- No one except numismatists understood the joke*

answer

- The movie delighted all boys and girls*

answer

- If anyone relayed the message to everyone, then no one understood every part of it*

answer

Use derivations to establish the validity of the following arguments. You may use attachment rules.

- $\forall x (Fx \vee Gx)$

$$\frac{\forall x \neg Gx}{\forall x Fx}$$

answer

- $\forall x (Fx \rightarrow \forall y (Pxy \rightarrow Rxy))$

$$\forall y \forall x ((Fx \wedge Pxy) \rightarrow Rxy)$$

answer

- Use a derivation to show that the following argument is not valid and describe a structure dividing one of the derivation's open gaps.

$$\frac{\forall x (Fx \rightarrow \neg Rxx)}{\forall x \forall y (Fy \rightarrow \neg Rxy)}$$

$$\forall x \forall y (Fy \rightarrow \neg Rxy)$$

answer

Phi 270 F98 test 4 answers

1. Sam ordered a book, but instead of it he received a book he didn't want

T Q Q

2. No one saw the book that was lying on the table.
 No one is such that (he or she saw the book that was lying on the table)
 $(\forall x: \underline{x} \text{ is a person}) \rightarrow \underline{x} \text{ saw the book that was lying on the table}$
 $(\forall x: Px) \rightarrow Sx(\text{the book that was lying on the table})$
 $(\forall x: Px) \rightarrow Sx(bt)$

P: [is a person]; S: [saw]; b: [the book that was lying on]; t: the table

3. No one except numismatists understood the joke
 $(\forall x: \underline{x} \text{ is a person} \wedge \neg \underline{x} \text{ is a numismatist}) \rightarrow \underline{x} \text{ understood the joke}$
 $(\forall x: Px \wedge \neg Nx) \rightarrow Uxj$

N: [is a person]; P: [is a numismatist]; U: [understood]; j: the joke

4. The movie delighted all boys and girls
 all boys and girls are such that (the movie delighted them)
 $(\forall x: x \text{ is a boy or girl}) \text{ the movie delighted } x$
 $(\forall x: \underline{x} \text{ is a boy} \vee \underline{x} \text{ is a girl}) \text{ the movie delighted } \underline{x}$
 $(\forall x: Bx \vee Gx) Dmx$

B: [is a boy]; D: [delighted]; G: [is a girl]; m: the movie

5. If anyone relayed the message to everyone, then no one understood every part of it
 $(\forall x: x \text{ is a person}) \text{ if } x \text{ relayed the message to everyone, then no one understood every part of it}$
 $(\forall x: Px) (x \text{ relayed the message to everyone} \rightarrow \text{no one understood every part of the message})$
 $(\forall x: Px) ((\forall y: y \text{ is a person}) x \text{ relayed the message to } y \rightarrow (\forall z: z \text{ is a person}) \neg z \text{ understood every part of the message})$
 $(\forall x: Px) ((\forall y: Py) \underline{x} \text{ relayed the message to } y \rightarrow (\forall z: Pz) \neg (\forall w: w \text{ is a part of the message}) \underline{z} \text{ understood } \underline{w})$
 $(\forall x: Px) ((\forall y: Py) Rxmy \rightarrow (\forall z: Pz) \neg (\forall w: Twm) Uzwm)$
 P: [is a person]; R: [relayed to]; T: [is a part of];
 U: [understood]; m: the message

6. $\forall x (Fx \vee Gx)$ a:2
 $\forall x \neg Gx$ a:3

ⓐ

2 UI | Fa ∨ Ga 4
 3 UI | ¬ Ga (4)
 4 MTP | Fa (5)
 •
 5 QED | Fa 1

1 UG | $\forall x Fx$

7. $\forall x (Fx \rightarrow \forall y (Pxy \rightarrow Rxy))$ b:5

ⓐ

ⓑ

4 Ext | Fb ∧ Pba 4
 4 Ext | Fb (6)
 4 Ext | Pba (8)
 5 UI | Fb → ∀y (Pby → Rby) 6
 6 MPP | ∀y (Pby → Rby) a:7
 7 UI | Pba → Rba 8
 8 MPP | Rba (9)
 •
 9 QED | Rba 3

3 CP | (Fb ∧ Pba) → Rba 2

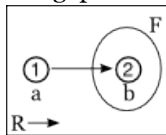
2 UG | $\forall x ((Fx \wedge Pxa) \rightarrow Rxa)$ 1

1 UG | $\forall y \forall x ((Fx \wedge Pxy) \rightarrow Rxy)$

8. $\forall x (Fx \rightarrow \neg Rxx)$ b:5, a:7

	(a)		
	(b)		
		Fb	(6)
		Rab	
5 UI		Fb $\rightarrow \neg Rbb$	6
6 MPP		$\neg Rbb$	
7 UI		Fa $\rightarrow \neg Raa$	8
		$\neg Fa$	
		○	Fb, Rab, $\neg Rbb, \neg Fa \Rightarrow \perp$
		\perp	9
9 IP		Fa	8
		$\neg Raa$	
		○	Fb, Rab, $\neg Rbb, \neg Raa \Rightarrow \perp$
		\perp	8
8 RC		\perp	4
4 RAA		$\neg Rab$	3
3 CP		Fb $\rightarrow \neg Rab$	2
2 UG		$\forall y (Fy \rightarrow \neg Ray)$	1
1 UG		$\forall x \forall y (Fy \rightarrow \neg Rxy)$	

This structure divides both gaps:



Phi 270 F97 test 4

(questions 1-3 are from quiz 4 and 4-9 are from quiz 5 out of 6 quizzes—these two quizzes addressed the part of the course your test is designed to cover)

- Identify individual terms and quantifier phrases in the following sentence and indicate links between pronouns and their antecedents. (You can do this by marking up an English sentence; you are *not* being asked to provide a symbolic analysis.)

Everyone who Carol lent the book to spoke to her at length about it.

answer

Analyze the following generalizations in as much detail as possible. Provide a key to the non-logical vocabulary (upper and lower case letters) appearing in your answer *and restate the result using an unrestricted quantifier.*

- Bob called no one.

answer

- Among contestants, only professionals were finalists.

answer

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.

- Bob doesn't own any map showing Dafter.

answer

- Nothing anyone said bothered Dave.

answer

Use derivations to establish the validity of the following arguments. You may use attachment rules.

- $\forall x (Fx \wedge Gx)$

$\forall x Fx$

answer

- $\forall x (Rxa \rightarrow \forall y Rxy)$

$\forall x (\forall y Rxy \rightarrow Rxb)$

answer

- Use a derivation to show that the following argument is not valid and describe a structure dividing one of the derivation's open gaps. (You will *not* need the rules UG+ and ST of 7.8 that were designed to avoid unending derivations.)

$\forall x (Fx \rightarrow Rax)$

$\forall x (Fx \rightarrow Rxa)$

answer

You will receive credit for *one* of the following (but you may attempt both):

9a. Synthesize an English sentence whose analysis would yield the following form.

$(\forall x: Dx) (Ox \rightarrow (\forall y: Dy) Oky)$

D: [is a door]; O: [opens]; k: the key

answer

9b. Use derivations to establish the validity of the following argument. You may use attachment rules.

$\forall x \forall y (Rxy \rightarrow \neg Fy)$

$\forall x (Fx \rightarrow Rxx)$

$\forall x \neg Fx$

answer

Phi 270 F97 test 4 answers

1. Everyone who Carol lent the book to spoke to her at length about it

Q T T

2. Bob called no one
no one is such that (Bob called him or her)

$(\forall x: \underline{x} \text{ is an person}) \neg \underline{\text{Bob called } x}$

$(\forall x: Px) \neg Cbx$

$\forall x (Px \rightarrow \neg Cbx)$

C: [called]; P: [is person]; b: Bob

3. Among contestants, only professionals were finalists
Among contestants, only professionals are such that (they were finalists)

$(\forall x: x \text{ was a contestant} \wedge \neg x \text{ was a professional}) \neg x \text{ was a finalist}$

$(\forall x: Cx \wedge \neg Px) \neg Fx$

$\forall x ((Cx \wedge \neg Px) \rightarrow \neg Fx)$

C: [was a contestant]; F: [was a finalist]; P: [was a professional]

4. Bob doesn't own any map showing Dafter
every map showing Dafter is such that (Bob doesn't own it)

$(\forall x: x \text{ is a map showing Dafter}) \neg \underline{\text{Bob owns } x}$

$(\forall x: \underline{x} \text{ is a map} \wedge \underline{x} \text{ shows Dafter}) \neg Obx$

$(\forall x: Mx \wedge Sxd) \neg Obx$

M: [is a map]; O: [owns]; S: [shows]; b: Bob; d:

Dafter

5. Nothing anyone said bothered Dave
everyone is such that (nothing he or she said bothered Dave)

$(\forall x: x \text{ is a person}) \text{ nothing } x \text{ said bothered Dave}$

$(\forall x: Px) \text{ nothing } x \text{ said is such that (it bothered Dave)}$

$(\forall x: Px) (\forall y: y \text{ is a thing } x \text{ said}) \neg y \text{ bothered Dave}$

$(\forall x: Px) (\forall y: x \text{ said } y) \neg Byd$

$(\forall x: Px) (\forall y: Sxy) \neg Byd$

B: [bothered]; P: [is a person]; S: [said]; d: Dave

6. $\forall x (Fx \wedge Gx) \quad a:2$

2 UI $Fa \wedge Ga \quad 3$

3 Ext Fa

3 Ext $Ga \quad (4)$

4 QED $Fa \quad 1$

1 UG $\forall x Fx$

7. $\forall x (Rxa \rightarrow \forall y Rxy) \quad c:4$

3 UI $\forall y Rcy \quad a:3$

4 QED $Rcb \quad (4)$

2 CP $\forall y Rcy \rightarrow Rcb \quad 1$

1 UG $\forall x (\forall y Rxy \rightarrow Rxb)$

3 UI $\forall y Rcy \quad a:3$

4 UI $Rca \quad (5)$

5 MPP $Rca \rightarrow \forall y Ryc \quad 5$

6 UI $\forall y Ryc \quad (7)$

7 QED $Rbc \quad 2$

2 CP $\forall y Rcy \rightarrow Rbc \quad 1$

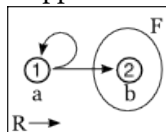
1 UG $\forall x (\forall y Rxy \rightarrow Rbx)$

[The first premise is never used in the derivation for this question (shown at the left). The fact that it was not needed was a slip on my part in making up the question; at the right is the sort of example I probably had in mind.]

8. $\forall x (Fx \rightarrow Rax)$ b:3, a:5

	(b)		
		Fb	(4)
3 UI		Fb \rightarrow Rab	4
4 MPP		Rab	
5 UI		Fa \rightarrow Raa	7
		\neg Rba	
		\neg Fa	
		o	Fb, Rab, \neg Rba, \neg Fa $\Rightarrow \perp$
		\perp	8
8 IP		Fa	7
		Raa	
		o	Fb, Rab, \neg Rba, Raa $\Rightarrow \perp$
		\perp	7
7 RC		\perp	6
6 IP		Rba	2
2 CP		Fb \rightarrow Rba	1
1 UG		$\forall x (Fx \rightarrow Rxa)$	

The structure below divides both gaps; it will divide only the first gap if the arrow from 1 to itself is dropped.



- 9a. $(\forall x: x \text{ is a door}) (the \text{ key opens } x \rightarrow (\forall y: y \text{ is a door}) \text{ the key opens } y)$
 $(\forall x: x \text{ is a door}) (the \text{ key opens } x \rightarrow \text{every door is such that (the key opens it)})$
 $(\forall x: x \text{ is a door}) (the \text{ key opens } x \rightarrow \text{the key opens every door})$
 $(\forall x: x \text{ is a door}) \text{ if the key opens } x, \text{ then it opens every door}$
 every door is such that (if the key opens it, then it opens every door)
 If the key opens any door, then it opens every door

9b. $\forall x \forall y (Rxy \rightarrow \neg Fy)$ a:2
 $\forall x (Fx \rightarrow Rxx)$ a:4

	(a)		
2 UI		$\forall y (Ray \rightarrow \neg Fy)$	a:6
		Fa	(5), (8)
4 UI		Fa \rightarrow Raa	5
5 MPP		Raa	(7)
6 UI		Raa $\rightarrow \neg$ Fa	7
7 MPP		\neg Fa	(8)
		•	
8 Nc		\perp	3
3 RAA		\neg Fa	1
1 UG		$\forall x \neg Fx$	

Phi 270 F96 test 4

(questions 1-3 are from quiz 4 and 4-9 are from quiz 5 out of 6 quizzes—these two quizzes addressed the part of the course your test is designed to cover)

- Identify individual terms and quantifier phrases in the following sentence and indicate links between pronouns and their antecedents. (You can do this by marking up an English sentence; you are *not* being asked to provide a symbolic analysis.)

Al called everyone who left him a message concerning the accident and told them he had seen it.

answer

Analyze the following generalizations in as much detail as possible. Provide a key to the non-logical vocabulary (upper and lower case letters) appearing in your answer *and restate the result using an unrestricted quantifier.*

- Every employee received the letter.

answer

- Among bystanders, Sam interviewed only soldiers.

answer

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.

- If anyone guessed the number, the prize was awarded.

answer

- Everyone who worked on any part of the project was honored.

answer

Synthesize an English sentence whose analysis would yield the following form.

- $(\forall x: Px) \rightarrow \forall y Axy$

A: [ate]; P: [is a person]

answer

Use derivations to establish the validity of the following arguments. You may use attachment rules.

- $\forall x Fx$
 $\forall x Gx$

$\forall x (Fx \wedge Gx)$

answer

- $\forall x (Fx \rightarrow Rxa)$

$\forall x (Rxa \rightarrow \forall y Ryx)$

$\forall x \forall y (Fy \rightarrow Rxy)$

answer

- Use a derivation to show that the following argument is not valid and describe a structure dividing one of the derivation's open gaps. (You will *not* need the rules UG+ and ST introduced in §7.8 that are designed to avoid unending gaps.)

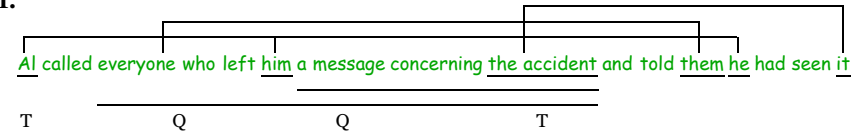
$\forall x Rxx$

$Rab \rightarrow \forall x Rxa$

answer

Phi 270 F96 test 4 answers

-



[it could instead have a message concerning the accident as its antecedent]

- Every employee received the letter
Every employee is such that (he or she received the letter)
 $(\forall x: x \text{ is an employee}) x \text{ received the letter}$

$(\forall x: Ex) Rxl$

$\forall x (Ex \rightarrow Rxl)$

E: [is an employee]; R: [received]; l: the letter

- Among bystanders, Sam interviewed only soldiers
Among bystanders, only soldiers are such that (Sam interviewed them)
 $(\forall x: x \text{ was a bystander} \wedge \neg x \text{ was a soldier}) \neg \text{Sam interviewed } x$

$(\forall x: Bx \wedge \neg Sx) \neg Isx$

$\forall x ((Bx \wedge \neg Sx) \rightarrow \neg Isx)$

B: [was a bystander]; I: [interviewed]; S: [was a soldier]; s: Sam

- If anyone guessed the number, the prize was awarded
Everyone is such that (if he or she guessed the number, the prize was awarded)
 $(\forall x: x \text{ is a person}) (\text{if } x \text{ guessed the number, the prize was awarded})$
 $(\forall x: Px) (x \text{ guessed the number} \rightarrow \text{the prize was awarded})$

$(\forall x: Px) (Gxn \rightarrow Ap)$

P: [is a person]; G: [guessed]; n: the number

5. Everyone who worked on any part of the project was honored
 Every part of the project is such that (everyone who worked on it was honored)
 $(\forall x: x \text{ is a part of the project})$ everyone who worked on x was honored

$(\forall x: Rxj) (\forall y: y \text{ is a person who worked on } x) y \text{ was honored}$

$(\forall x: Rxj) (\forall y: y \text{ is a person} \wedge y \text{ worked on } x) Hy$

$(\forall x: Rxj) (\forall y: Py \wedge Wyx) Hy$

H: [_ was honored]; P: [_ is a person]; R: [_ is a part of _];

W: [_ worked on _]; j: the project

6. $(\forall x: x \text{ is a person}) \neg \forall y x \text{ ate } y$

$(\forall x: x \text{ is a person}) \neg x \text{ ate everything}$

No one is such that (he or she ate everything)

No one ate everything

7.

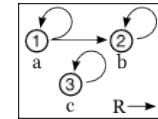
	$\forall x Fx$	a:2
	$\forall x Gx$	a:3
	(a)	
2 UI	Fa	(5)
3 UI	Ga	(6)
	•	
5 QED	Fa	4
	•	
6 QED	Ga	4
4 Cnj	Fa \wedge Ga	1
1 UG	$\forall x (Fx \wedge Gx)$	1

8.

	$\forall x (Fx \rightarrow Rxa)$	c:4
	$\forall x (Rxa \rightarrow \forall y Ryc)$	c:6
	(b)	
	(c)	
	Fc	(5)
4 UI	Fc \rightarrow Rca	5
5 MPP	Rca	(7)
6 UI	Rca $\rightarrow \forall y Ryc$	7
7 MPP	$\forall y Ryc$	b:8
8 UI	Rbc	(9)
	•	
9 QED	Rbc	3
3 CP	Fc \rightarrow Rbc	2
2 UG	$\forall y (Fy \rightarrow Rby)$	1
1 UG	$\forall x \forall y (Fy \rightarrow Rxy)$	

9.

	$\forall x Rxx$	a:1,b:2,c:5
1 UI	Raa	
2 UI	Rbb	
	Rab	
	(c)	
5 UI	Rcc	
	\neg Rca	
	o	
	\perp	6
6 IP	Rca	4
4 UG	$\forall x Rxa$	3
3 CP	Rab $\rightarrow \forall x Rxa$	



Raa,Rab,Rbb,Rcc, \neg Rca $\Rightarrow \perp$