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.]

answer

2. Tom can solve the puzzle if anyone can. [In this case, restate your answer using an unrestricted quantifier.]

answer

3. No one received every vote

answer

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.
$$\frac{\begin{array}{l}\forall x\,(Dx \rightarrow Mx)\\ \forall x\,(\neg\, Ax \rightarrow \neg\, Mx)\end{array}}{\forall x\,(Dx \rightarrow Ax)}$$

answer

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

5.
$$\frac{\forall x\,\forall y\,((Py \wedge Byx) \rightarrow Dyx)}{\forall x\,(Px \rightarrow \forall y\,(Bxy \rightarrow Dxy))}$$

answer

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.

$$\frac{\begin{array}{l}\forall x\,(Rxx \rightarrow \neg\, Fx)\\ \forall x\,Rxc\end{array}}{\forall x\,\forall y\,(Fy \rightarrow \neg\, Rxy)}$$

answer

Phi 270 Foo test 4 answers

1. Only necessary projects were funded

(∀x: ¬ x was a necessary project) ¬ x was funded

(∀x: ¬ (x was a project ∧ x was necessary)) ¬ x was funded

(∀x: ¬ (Px ∧ Nx)) ¬ Fx

or: (∀x: Px ∧ ¬ Nx) ¬ Fx—i.e., No unnecessary projects were funded;

or: (∀x: Nx ∧ ¬ Px) ¬ 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

(∀x: x is a person) Tom can solve the puzzle if x can

(∀x: Px) (Tom can solve the puzzle ← x can solve the puzzle)

(∀x: Px) (S Tom the puzzle ← S x the puzzle)

(∀x: Px) (Stp ← Sxp) [*or:* (∀x: Px) (Sxp → Stp)]

∀x (Px → (Stp ← Sxp)) [*or:* ∀x (Px → (Sxp → Stp))]

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

3. No one received every vote

(∀x: x is a person) ¬ x received every vote

(∀x: Px) ¬ x received every vote

(∀x: Px) ¬ (∀y: y is a vote) x received y

(∀x: Px) ¬ (∀y: Vy) Rxy

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

Incorrect answers:

(∀x: Px) (∀y: Vy) ¬ Rxy *says* No one received any vote

¬ (∀x: Px) (∀y: Vy) Rxy *says* Not everyone received every vote

(∀y: Vy) ¬ (∀x: Px) Rxy *says* No vote is such that everyone received it

4.

	∀x (Dx → Mx)	a:3
	∀x (¬ Ax → ¬ Mx)	a:5
	ⓐ	
	Da	(4)
3 UI	Da → Ma	4
4 MPP	Ma	(6)
5 UI	¬ Aa → ¬ Ma	6
6 MTT	Aa	(7)
	•	
7 QED	Aa	2
2 CP	Da → Aa	1
1 UG	∀x (Dx → Ax)	

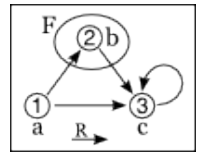
5.

	∀x ∀y ((Py ∧ Byx) → Dyx)	b:5
	ⓐ	
	Pa	(9)
	ⓑ	
	Bab	(10)
5 UI	∀y ((Py ∧ Byb) → Dyb)	a:6
6 UI	(Pa ∧ Bab) → Dab	8
	¬ Dab	(8)
8 MTT	¬ (Pa ∧ Bab)	9
9 MPT	¬ Bab	(10)
10 Nc	⊥	7
7 IP	Dab	4
4 CP	Bab → Dab	3
3 UG	∀y (Bay → Day)	2
2 CP	Pa → ∀y (Bay → Day)	1
1 UG	∀x (Px → ∀y (Bxy → Dxy))	

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

6.

	∀x (Rxx → ¬ Fx)	b:4, c:9, a:11
	∀x Rxc	a:6, b:7, c:8
	ⓐ	
	ⓑ	
	Fb	(5)
4 UI	Rbb → ¬ Fb	5
5 MTT	¬ Rbb	
6 UI	Rac	
7 UI	Rbc	
8 UI	Rcc	(10)
9 UI	Rcc → ¬ Fc	10
10 MPP	¬ Fc	
11 UI	Raa → ¬ Fa	13
	Rab	
	¬ Raa	
	○	Fb,¬Rbb,Rac,Rbc,Rcc,¬Fc,Rab,¬Raa ⇏ ⊥
	⊥	14
14 IP	Raa	13
	¬ Fa	
	○	Fb,¬Rbb,Rac,Rbc,Rcc,¬Fc,Rab,¬Fa ⇏ ⊥
	⊥	13
13 RC	⊥	12
12 RAA	¬ Rab	3
3 CP	Fb → ¬ Rab	2
2 UG	∀y (Fy → ¬ Ray)	1
1 UG	∀x ∀y (Fy → ¬ Rxy)	



divides both open gaps