Phi 270 F05 test 3

Analyze the sentences below in as much detail as possible *using only connectives;* that is, the unanalyzed components should all be sentences (rather than individual terms, predicates, or functors). Present the result in *both symbolic and English notation*. Be sure that the unanalyzed components of your answer are complete and independent sentences; also try to respect any grouping in the English.

1. If the part was fixed, it broke again.

answer

2. Unless Tom was early, he got in only if he paid extra.

answer

Use derivations to check whether each of the entailments below holds. You may use detachment and attachment rules. If an entailment fails, present a counterexample that divides an open gap.

3. $A \rightarrow (B \rightarrow C), C \rightarrow D \Rightarrow B \rightarrow (A \rightarrow D)$

answer

4. $(C \wedge A) \rightarrow B \Rightarrow (A \wedge B) \rightarrow C$

answer

Analyze the sentence below in as much detail as possible, giving a key to your abbreviations of unanalyzed expressions. In this case you *should* identify components that are individual terms, predicates, or functors; however, you do not need to present the result in English notation (i.e., symbolic notation is enough). (Be sure that the unanalyzed components of your answer are independent—in particular, that none contains a pronoun whose antecedent is in another—and be sure also that the individual terms you identify really are individual terms rather than general terms or quantifier phrases.)

5. Either Fred is the manager or he owns the business.

answer

6. Sam received a recall notice from the manufacturer of his car.

answer

Use a derivation to show that the entailment below holds. You may use detachment and attachment rules. (Be sure to indicate the alias sets whenever an equation is added to the resources.)

7. $Rb(fa), fb = gc, c = fb, d = gc \Rightarrow c = d \wedge (a = b \rightarrow Ra(gd))$

answer

Phi 270 F05 test 3 answers

1. If the part was fixed, it broke again

the part was fixed → the part broke again

$$F \rightarrow B$$

if F then B

B: the part broke again; F: the part was fixed

2. Unless Tom was early, he got in only if he paid extra

¬ Tom was early → Tom got in only if he paid extra

¬ Tom was early → (¬ Tom got in ← ¬ Tom paid extra)

$$\neg T \rightarrow (\neg G \leftarrow \neg P)$$

$$\neg T \rightarrow (\neg P \rightarrow \neg G)$$

if not T then if not P then not G

G: Tom got in; P: Tom paid extra; T: Tom was early

3.

	$A \rightarrow (B \rightarrow C)$	3
	$C \rightarrow D$	5
	B	(4)
	A	(3)
3 MPP	$B \rightarrow C$	4
4 MPP	C	(5)
5 MPP	D	(6)
	•	
6 QED	D	2
2 CP	$A \rightarrow D$	1
1 CP	$B \rightarrow (A \rightarrow D)$	

4.

	$(C \wedge A) \rightarrow B$	4
	$A \wedge B$	2
2 Ext	A	(7)
2 Ext	B	
	$\neg C$	
	$\neg C$	
	$\circ$	$A, B, \neg C \Rightarrow \bot$
	$\bot$	6
6 IP	C	5
	$\bullet$	
7 QED	A	5
5 Cnj	$C \wedge A$	4
	B	
	$\circ$	$A, B, \neg C \Rightarrow \bot$
	$\bot$	4
4 RC	$\bot$	3
3 IP	C	1
1 CP	$(A \wedge B) \rightarrow C$	

A B C	$(C \wedge A) \rightarrow B$ / $(A \wedge B) \rightarrow C$
T T F	F Ⓣ T Ⓕ

5. Either Fred is the manager or he owns the business

Fred is the manager ∨ Fred owns the business

Fred = the manager ∨ [_ owns _] Fred the business

f = m ∨ Ofb

O: [_ owns _]; b: the business; f: Fred; m: the manager

6. Sam received a recall notice from the manufacturer of his car
Sam received a recall notice from the manufacturer of his car
[_ received a recall notice from _] Sam the manufacturer of Sam's car
R s (the manufacturer of Sam's car)
R s ([the manufacturer of _)] Sam's car)
R s (m (Sam's car))
R s (m ([_'s car] Sam))

Rs(m(cs))

R: [_ received a recall notice from _]; c: [_'s car]; m: [the manufacturer of _]; s: Sam

7.

	Rb(fa)	(4)
	fb = gc	fb–gc, a, b, c, d, fa, gd
	c = fb	c–fb–gc, a, b, d, fa, gd
	d = gc	c–fb–gc–d–gd, a, b, fa
	•	
2 EC	c = d	1
	a = b	c–fb–gc–d–gd–fa, a–b
	•	
4 QED=	Ra(gd)	3
3 CP	a = b → Ra(gd)	1
1 Cnj	c = d ∧ (a = b → Ra(gd))	