Phi 270 F03 test 3

Analyze the sentences below in as much detail as possible *using only connectives*; that is, you *should not* identify components that are individual terms (or 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 it was cloudy, Bob didn't see the eclipse*
   [answer]
2. *Unless the lock is broken, you can get in only if you have a key*
   [answer]

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

3. $A \rightarrow \neg C, B \rightarrow C \Rightarrow A \rightarrow \neg B$
   [answer]
4. $(A \wedge B) \rightarrow C \Rightarrow B \rightarrow (\neg C \rightarrow A)$
   [answer]

Analyze the sentence below in as much detail as possible. In this case you should identify components that are individual terms, predicates, or functors. Be sure that the unanalyzed components of your answer are independent (in particular, that none contains a pronoun whose antecedent is in another).

5. *If Sam asked Tom to drive him to the meeting, then he is the person who called earlier*
   [answer]
6. *Dave's father called the mother of the child who hit him*
   [answer]

Use a derivation to show that the entailment below holds. You may use detachment and attachment rules.

7. $a = b \wedge Rac \Rightarrow fa = c \rightarrow Rb(fb)$
   [answer]

Phi 270 F03 test 3 answers

1. *If it was cloudy, Bob didn't see the eclipse*
   it was cloudy → *Bob didn't see the eclipse*
   it was cloudy → ¬ *Bob saw the eclipse*
                $C \rightarrow \neg S$
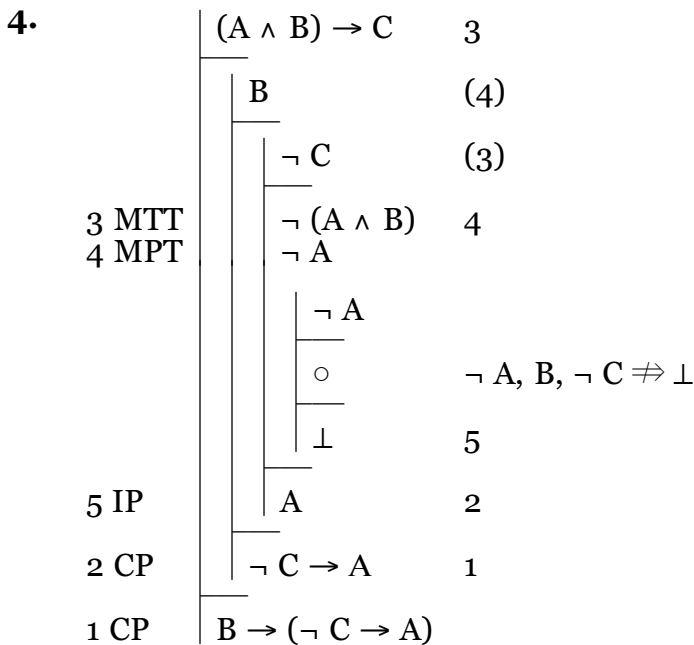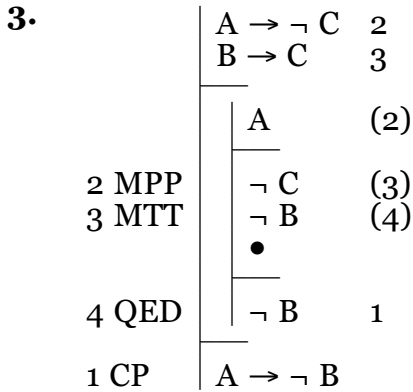   if C then not S
   [C: *it was cloudy*; S: *Bob saw the eclipse*]

2. *Unless the lock is broken, you can get in only if you have a key*

¬ the lock is broken → you can get in only if you have a key

¬ the lock is broken → (¬ you can get in ← ¬ you have a key)

$$\neg\,B \to (\neg\,G \leftarrow \neg\,K)$$
$$\neg\,B \to (\neg\,K \to \neg\,G)$$

`if not B then if not K then not G`

[B: *the lock is broken*; G: *you can get in*; K: *you have a key*]

3.

	A → ¬ C	2
	B → C	3
	A	(2)
2 MPP	¬ C	(3)
3 MTT	¬ B	(4)
	●	
4 QED	¬ B	1
1 CP	A → ¬ B	

4.

	(A ∧ B) → C	3
	B	(4)
	¬ C	(3)
3 MTT	¬ (A ∧ B)	4
4 MPT	¬ A	
	¬ A	
	○	¬ A, B, ¬ C ⇏ ⊥
	⊥	5
5 IP	A	2
2 CP	¬ C → A	1
1 CP	B → (¬ C → A)	

A B C	(A ∧ B) → C / B → (¬ C → A)
F T F	F Ⓣ Ⓕ T F

5. *If Sam asked Tom to drive him to the meeting, then he is the person who called earlier*

Sam asked Tom to drive him to the meeting → Sam is the person who called earlier

[λxyzw (x *asked* y *to drive* z *to* w] <u>Sam</u> <u>Tom</u> <u>Sam</u> <u>the meeting</u> → <u>Sam</u> = <u>the person who called earlier</u>

$$Astsm \to s = p$$

[A: λxyzw (x *asked* y *to drive* z *to* w); m: *the meeting*; p: *the person who called earlier*; s: *Sam*; t: *Tom*]

6. *Dave's father called the mother of the child who hit him*

[λxy (x *called* y)] <u>*Dave's father*</u> <u>*the mother of the child who hit Dave*</u>

C([λx (x*'s father*)] <u>*Dave*</u>)([λx (*the mother of* x)](<u>*the child who hit Dave*</u>))

C(fd)(m([λx (*the child who hit* x)]d))

$$C(fd)(m(hd))$$

[C: λxy (x *called* y); d: *Dave*; f: λx (x*'s father*); h: λx (*the child who hit* x); m: λx (*the mother of* x)]

7.

	a = b ∧ Rac	1
1 Ext	a = b	a=b, c, fa=fb
1 Ext	Rac	(3)
	fa = c	a=b, c=fa=fb
	●	
3 QED=	Rb(fb)	2
2 CP	fa = c → Rb(fb)	