Phi 270 F11 test 3

F11 test 3 topics

The following are the topics to be covered. The proportion of the test covering each will approximate the proportion of the classes so far that have been devoted to that topic. Your homework and the collection of old tests will provide specific examples of the kinds of questions I might ask.

- *Analysis.* Two sorts of questions are possible here corresponding to the sorts of analyses you have done in chs. 5 and 6: (i) analysis by truth-functional connectives only, with atomic sentences as the ultimate components (the focus would, of course, be on conditionals—i.e., on the symbolic representation of if, only if, and unless) and (ii) analysis using, in addition to truth-functional connectives, the ideas of predicates, individual terms, and functors.

  In the case of the latter sort of analysis, you might be asked to preserve pronouns, representing them using abstracts and variables. (You will find questions of this sort only in the last 5 years or so of exams, but your homework on this topic and exercise 2 for 6.2 provide further examples.)
- *Synthesis.* Again this might take two forms, depending on whether the expressions abbreviated by letters were are complete sentences or were terms, predicates, and functors—i.e., depending on whether the question is directed at ch. 5 or ch. 6.
- *Derivations.* Be able to construct derivations to show that entailments hold and to show that they fail. I may tell you in advance whether an entailment holds or leave it to you to check that using derivations. There will be some derivations where detachment and attachment rules may be used and where they will shorten the proof. But there may be others where you must rely on other rules, either because detachment and attachment rules do not apply or because I tell you not to use them. In particular, be ready to use the rule RC (Rejecting a Conditional) from ch. 5.

  In the case of a derivation that includes forms involving predicates and functors, you won't be asked to present a counterexample if the derivation fails (though you will still need to be able to recognize that such a derivation has failed). In short, the test won't cover the new material introduced in 6.4.

F11 test 3 questions

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*, rewriting if necessary to make all symbolic conditionals point from left to right. 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 snow continues to accumulate, then there will be flooding if the thaw comes quickly.
2. The problem was handled by Al unless he was out, and he was out only if there was an emergency at another site.

Use derivations to check whether each of the entailments below holds. You may use detachment and attachment rules. If an entailment fails, confirm a counterexample that lurks in an open gap. (Your truth-table for a counterexample should show the truth-value of each compound component of sentence under the main connective of that component, and it should indicate the final truth-value of each sentence.)

3. $A \to (B \to \neg D),\ C \to D \vDash A \to (B \to \neg C)$
4. $A \to B,\ C \to (D \land E) \vDash A \to D$

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). Your analysis should be in reduced form (i.e., you *should not* use abstracts and variables), so be sure that the unanalyzed components of your answer are independent—in particular, that none contains a pronoun whose antecedent is in another—and that they are completely specified. In particular, the expressions letters stand for should be complete sentences or individual terms except for blanks marking the places of predicates and functors (so, in particular, no letter should stand for a bare common nouns like dog since they are not complete individual terms).

5. Al discovered his enemy, and it was his boss.

Analyze the sentence below using abstracts and variables to represent pronominal cross reference (instead of replacing pronouns by their antecedents). That is, use expanded form to the extent necessary so that each individual term in your analysis appears only as often as it appears in the original sentence. In other respects, your analysis should be as described for **5**.

6. Dave hated the book, but he liked the movie that was made from it.

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. $fa = gc,\ fb = gd,\ Kc(fa) \vDash c = d \to (fa = fb \land Kd(gd))$

F11 test 3 answers

1. If the snow continues to accumulate, then there will be flooding if the thaw comes quickly

the snow will continue to accumulate → there will be flooding if the thaw comes quickly

the snow will continue to accumulate → (there will be flooding ← the thaw will come quickly)

$$S \to (F \leftarrow T)$$
$$S \to (T \to F)$$

if S then if T then F

F: there will be flooding; S: the snow will continue to accumulate; T: the thaw will come quickly

2. The problem was handled by Al unless he was out, and he was out only if there was an emergency at another site.

the problem was handled by Al unless he was out ∧ Al was out only if there was an emergency at another site

(the problem was handled by Al ← ¬ Al was out) ∧ (¬ Al was out ← ¬ there was an emergency at another site)

$$(H \leftarrow \neg O) \land (\neg O \leftarrow \neg E)$$
$$(\neg O \to H) \land (\neg E \to \neg O)$$

both if not O then H and if not E then not O

E: there was an emergency at another site; H: the problem was handled by Al; O: Al was out

3.

	$A \to (B \to \neg D)$	4
	$C \to D$	5
	A	(4)
	B	(6)
	C	(5)
4 MPP	$B \to \neg D$	6
5 MPP	D	(7)
6 MPP	$\neg D$	(7)
	●	
7 Nc	$\bot$	3
3 RAA	$\neg C$	2
2 CP	$B \to \neg C$	1
1 CP	$A \to (B \to \neg C)$	

OR

	$A \to (B \to \neg D)$	2
	$C \to D$	5
	A	(2)
2 MPP	$B \to \neg D$	4
	B	(4)
4 MPP	$\neg D$	(5)
5 MTT	$\neg C$	(6)
	●	
6 QED	$\neg C$	3
3 CP	$B \to \neg C$	1
1 CP	$A \to (B \to \neg C)$	

And there are many other possible derivations

4.

	$A \to B$	2
	$C \to (D \land E)$	4
	A	(2)
2 MPP	B	
	$\neg D$	(7)
	$\neg C$	
	○	$\neg C, \neg D, B, A \nvDash \bot$
	$\bot$	5
5 IP	C	4
	$D \land E$	6
6 Ext	D	(7)
6 Ext	E	
	●	
7 Nc	$\bot$	4
4 RC	$\bot$	3
3 IP	D	1
1 CP	$A \to D$	

A	B	C	D	E	A → B	,	C → (D ∧ E)	/	A → D
T	T	F	F	T	Ⓣ		Ⓣ F		Ⓕ
T	T	F	F	F	Ⓣ		Ⓣ F		Ⓕ

Either counterexample will do; both lurk in the open gap since E does not appear in its proximate argument.

5. Al discovered his enemy, and it was his boss

Al discovered his enemy ∧ Al's enemy was his boss

Al discovered his enemy ∧ Al's enemy was his boss

[_ discovered _]Al Al's enemy ∧ Al's enemy = Al's boss

D a ([_'s enemy] Al) ∧ [_'s enemy] Al = [_'s boss] Al

$$Da(ea) \land ea = ba$$

D: [_ discovered _]; b: [_'s boss]; e: [_'s enemy]; a: Al

6. Dave hated the book, but he liked the movie that was made from it

Dave and the book are such that (he hated it, but he liked the movie that was made from it)

$[x$ hated y, but x liked the movie that was made from $y]_{xy}$ Dave the book

$[x$ hated $y \land x$ liked the movie that was made from $y]_{xy}$ Dave the book

[[_ hated _] x y ∧ [_ liked _] x ([the movie that was made from _] y) $]_{xy}$db

$$[\ Hxy \land Lx(my)\ ]_{xy}db$$

H: [_ hated _]; L: [_ liked _]; m: [the movie that was made from _]; b: the book; d: Dave

7.

	fa = gc	
	fb = gd	fa–gc, a, c, fb–gd, b, d
	Kc(fa)	(4)
	│ c = d	fa–gc–fb–gd, a, c–d, b
	│ │ ●	
3 EC	│ │ fa = fb	2
	│ │ ●	
4 QED=	│ │ Kd(gd)	2
2 Cnj	│ fa = fb ∧ Kd(gd)	1
1 CP	c = d → (fa = fb ∧ Kd(gd))	

Phi 270 F10 test 3

F10 test 3 topics

The following are the topics to be covered. The proportion of the test covering each will approximate the proportion of the classes so far that have been devoted to that topic. Your homework and the collection of old tests will provide specific examples of the kinds of questions I might ask.

- *Analysis.* Two sorts of questions are possible here corresponding to the sorts of analyses you have done in chs. 5 and 6: (i) analysis by truth-functional connectives only, with atomic sentences as the ultimate components (the focus would, of course, be on conditionals—i.e., on the symbolic representation of if, only if, and unless) and (ii) analysis using truth-functional connnectives and the ideas of predicates, individual terms, and functors.

  In the case of the latter sort of analysis, you might be asked to preserve pronouns, representing them using abstracts and variables. (You will not find questions of this sort in the exams before 2006, but your homework on this topic and exercise 2 for 6.2 provide further examples.)
- *Synthesis.* Again this might take two forms, depending on whether the expressions abbreviated by letters were are complete sentences or were terms, predicates, and functors—i.e., depending on whether the question is directed at ch. 5 or ch. 6.
- *Derivations.* Be able to construct derivations to show that entailments hold and to show that they fail. I may tell you in advance whether an entailment holds or leave it to you to check that using derivations. There will be some derivations where detachment and attachment rules may be used and where they will shorten the proof. But there may be others where you must rely on other rules, either because detachment and attachment rules do not apply or because I tell you not to use them. In particular, be ready to use the rule RC (Rejecting a Conditional) from ch. 5.

  In the case of a derivation that includes forms involving predicates and functors, you won't be asked to present a counterexample if the derivation fails (though you will still need to be able to recognize that such a derivation has failed). In short, the test won't cover the new material introduced in 6.4.

F10 test 3 questions

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*, rewriting if necessary to make all symbolic conditionals point from left to right. Be sure that the unanalyzed components of your answer are complete and independent sentences; also try to respect any grouping in the English.

1. They won't get home early if they go through the city during rush hour.

2. Unless it was raining, the picnic was postponed only if it was unusually cold.

Use derivations to check whether each of the entailments below holds. You may use detachment and attachment rules. If an entailment fails, confirm a counterexample that lurks in an open gap. (Your truth-table for a counterexample should show the truth-value of each compound component of sentence under the main connective of that component, and it should indicate the final truth-value of each sentence.)

3. B → (A → C) ⊨ (A ∧ B) → C

4. A → ¬ C, C → B ⊨ ¬ B → A

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). Your analysis should be in reduced form (i.e., you *should not* use abstracts and variables), so be sure that the unanalyzed components of your answer are independent—in particular, that none contains a pronoun whose antecedent is in another. (Also be sure also that the individual terms you identify really are individual terms and are not quantifier phrases or general terms like simple common nouns.)

5. If Al went through Phoenix, he stayed with Barb's family.

Analyze the sentence below using abstracts and variables to represent pronominal cross reference (instead of replacing pronouns by their antecedents). That is, use expanded form to the extent necessary so that each individual term in your analysis appears only as often as it appears in the original sentence. In other respects, your analysis should be as described for **5**.

6. Ann spoke to Bill, and he introduced himself to Carol.

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. Ga → a = c, Rb(fa) ⊨ b = c → (Ga → Ra(fb))

F10 test 3 answers

1. they won't get home early if they go through the city during rush hour

they won't get home early ← they will go through the city during rush hour

¬ they will get home early ← they will go through the city during rush hour

$$\neg E \leftarrow R$$
$$R \rightarrow \neg E$$

if R then not E

E: they will get home early; R: they will go through the city during rush hour

2. unless it was raining, the picnic was postponed only if it was unusually cold

¬ it was raining → the picnic was postponed only if it was unusually cold

¬ it was raining → (¬ the picnic was postponed ← ¬ it was unusually cold)

$$\neg R \rightarrow (\neg P \leftarrow \neg C)$$
$$\neg R \rightarrow (\neg C \rightarrow \neg P)$$

if not R then if not C then not P

C: it was unusually cold; P: the picnic was postponed; R: it was raining

3.

	B → (A → C)	3
	│ A ∧ B	2
2 Ext	│ A	(4)
2 Ext	│ B	(3)
3 MPP	│ A → C	4
4 MPP	│ C	(5)
	│ ●	
5 QED	│ C	1
1 CP	(A ∧ B) → C	

4.

	A → ¬ C	4
	C → B	2
	│ ¬ B	(2)
2 MTT	│ ¬ C	
	│ │ ¬ A	
	│ │ │ ¬ A	
	│ │ │ ○	¬ A, ¬ C, ¬ B ⊭ ⊥
	│ │ │ ⊥	5
5 IP	│ │ A	4
	│ │ │ ¬ C	
	│ │ │ ○	¬ C, ¬ A, ¬ B ⊭ ⊥
	│ │ │ ⊥	4
4 RC	│ │ ⊥	3
3 IP	│ A	1
1 CP	¬ B → A	

A	B	C	A → ¬ C,	C → B	/ ¬ B → A
F	F	F	Ⓣ T	Ⓣ	T Ⓕ

5. if Al went through Phoenix, he stayed with Barb's family

Al went through Phoenix → Al stayed with Barb's family

[_ went through _] Al Phoenix → [_ stayed with _] Al (Barb's family)

Wap → Sa([_'s family] Barb)

Wap → Sa(fb)

S: [_ stayed with _]; W: [_ went through _ to _]; a: Al; b: Barb; p: Phoenix; f: [_'s family]

6. Ann spoke to Bill, and he introduced himself to Carol

Bill is such that (Ann spoke to him, and he introduced himself to Carol)

$[\text{Ann spoke to x, and x introduced x to Carol}]_x$ Bill

$[\text{Ann spoke to x} \wedge \text{x introduced x to Carol}]_x$b

$[[\ _\ \text{spoke to}\ _\ ]\ \text{Ann x} \wedge [\ _\ \text{introduced}\ _\ \text{to}\ _\ ]\ \text{x x Carol}]_x$b

$$[Sax \wedge Ixxc]_x b$$

I: [_ introduced _ to _]; S: [_ spoke to _]; a: Ann; b: Bill; c: Carol

7.

	Ga → a = c	3
	Rb(fa)	(4)
	│ b = c	a, b–c, fa, fb
	│ │ Ga	(3)
3 MPP	│ │ a = c	a–b–c, fa–fb
	│ │ ●	
4 QED=	│ │ Ra(fb)	2
2 CP	│ Ga → Ra(fb)	1
1 CP	b = c → (Ga → Ra(fb))	

Phi 270 F09 test 3

F09 test 3 topics

The following are the topics to be covered. The proportion of the test covering each will approximate the proportion of the classes so far that have been devoted to that topic. Your homework and the collection of old tests will provide specific examples of the kinds of questions I might ask.

- *Analysis*. Two sorts of questions are possible here corresponding to the sorts of analyses you have done in chs. 5 and 6: (i) analysis by truth-functional connectives only, with atomic sentences as the ultimate components (the focus would, of course, be on conditionals—i.e., on the symbolic representation of if, only if, and unless) and (ii) analysis using truth-functional connnectives and the ideas of predicates, individual terms, and functors.

  In the case of the latter sort of analysis, you might be asked to preserve pronouns, representing them using abstracts and variables. (You will not find questions of this sort in the exams before 2006, but your homework on this topic and exercise 2 for 6.2 provide further examples.)
- *Synthesis*. Again this might take two forms, depending on whether the expressions abbreviated by letters were are complete sentences or were terms, predicates, and functors—i.e., depending on whether the question is directed at ch. 5 or ch. 6.
- *Derivations*. Be able to construct derivations to show that entailments hold and to show that they fail. I may tell you in advance whether an entailment holds or leave it to you to check that using derivations. There will be some derivations where detachment and attachment rules may be used and where they will shorten the proof. But there may be others where you must rely on other rules, either because detachment and attachment rules do not apply or because I tell you not to use them. In particular be ready to use the rule RC (Rejecting a Conditional) from ch. 5.

  In the case of a derivation that includes forms involving predicates and functors, you won't be asked to present a counterexample if the derivation fails (though you will still need to be able to recognize that such a derivation has failed). In short, the test won't cover the new material introduced in 6.4.

F09 test 3 questions

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 package was sent, then it was lost.

2. Al finished the project only if he had help; but he started it unless there was a rush order.

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

3. A → C, B → ¬ C ⊨ A → ¬ B

4. B → (A → C) ⊨ (B ∧ C) → D

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). Your analysis should be in reduced form (i.e., you *should not* use abstracts and variables), so be sure that the unanalyzed components of your answer are independent—in particular, that none contains a pronoun whose antecedent is in another. (Also be sure also that the individual terms you identify really are individual terms and are not quantifier phrases or general terms, like simple common nouns.)

5. Al sold his car to the first caller, and he bought Dave's truck.

Analyze the sentence below using abstracts and variables to represent pronominal cross reference (instead of replacing pronouns by their antecedents). That is, use expanded form to the extent necessary so that each individual term in your analysis appears only as often as it appears in the original sentence. In other respects, your analysis should be as described for **5**.

6. If Bill went to Chicago, then Ann didn't reach him.

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. a = fb, fc = d ⊨ (b = c ∧ ¬ Fc) → (a = d ∧ ¬ Fb)

F09 test 3 answers

1. If the package was sent, then it was lost.

the package was sent → the package was lost

S → L

if S then L

L: the package was lost; S: the package was sent

2. Al finished the project only if he had help; but he started it unless there was a rush order

Al finished the project only if he had help ∧ Al started the project unless there was a rush order

(¬ Al finished the project ← ¬ Al had help) ∧ (Al started the project ← ¬ there was a rush order)

(¬ F ← ¬ H) ∧ (S ← ¬ R)

(¬ H → ¬ F) ∧ (¬ R → S)

both if not H then not F and if not R then S

F: Al finished the project; H: Al had help; R: there was a rush order; S: Al started the project

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.

	B → (A → C)	3
	│ B ∧ C	2
2 Ext	│ B	(3)
2 Ext	│ C	
3 MPP	│ A → C	5
	│ │ ¬ D	
	│ │ │ │ ¬ A	
	│ │ │ │ ○	¬ A, ¬ D, B, C ⊭ ⊥
	│ │ │ │ ⊥	6
6 IP	│ │ │ A	5
	│ │ │ C	
	│ │ │ ○	C, ¬ D, B ⊭ ⊥
	│ │ │ ⊥	5
5 RC	│ │ ⊥	4
4 IP	│ D	1
1 CP	(B ∧ C) → D	

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

The first interpretation lurks in the first gap and the second in both. It is enough to reach one of the two dead ends and to confirm one counterexample that lurks in that gap.

5. Al sold his car to the first caller, and he bought Dave's truck
Al sold his car to the first caller ∧ Al bought Dave's truck
[_ sold _ to _] Al Al's car the first caller ∧ [_ bought _] Al Dave's truck
S a (Al's car) f ∧ B a (Dave's truck)
S a ([_'s car] Al) f ∧ B a ([_'s truck] Dave)

Sa(ca)f ∧ Ba(td)

B: [_ bought _]; S: [_ sold _ to _]; c: [_'s car]; t: [_'s truck]; a: Al; d: Dave

6. If Bill went to Chicago, then Ann didn't reach him
Bill is such that (if he went to Chicago, then Ann didn't reach him)
[if x went to Chicago, then Ann didn't reach x]$_x$ Bill
[x went to Chicago → Ann didn't reach x]$_x$ b
[x went to Chicago → ¬ Ann reached x]$_x$ b
[[_ went to _] x Chicago → ¬ [_ reached _] Ann x]$_x$ b

[Wxc → ¬ Rax]$_x$b

R: [_ reached _]; W: [_ went to _]; a: Ann; b: Bill; c: Chicago

7.

	a = fb	
	fc = d	a–fb, b, fc–d, c
	│ b = c ∧ ¬ Fc	2
2 Ext	│ b = c	a–fb–fc–d, b–c
2 Ext	│ ¬ Fc	(6)
	│ │ ●	
4 EC	│ │ a = d	3
	│ │ │ Fb	(6)
	│ │ │ ●	
6 Nc=	│ │ │ ⊥	
5 RAA	│ │ ¬ Fb	3
3 Cnj	│ a = d ∧ ¬ Fb	1
1 CP	(b = c ∧ ¬ Fc) → (a = d ∧ ¬ Fb)	

It is also possible to close the second gap at stage 5 using QED=.

Phi 270 F08 test 3

F08 test 3 topics

The following are the topics to be covered. The proportion of the test covering each will approximate the proportion of the classes so far that have been devoted to that topic. Your homework and the collection of old tests will provide specific examples of the kinds of questions I might ask.

- *Analysis*. Two sorts of questions are possible here corresponding to the sorts of analyses you have done in chs. 5 and 6: (i) analysis by truth-functional connectives only, with atomic sentences as the ultimate components (the focus would, of course, be on conditionals—i.e., on the symbolic representation of if, only if, and unless) and (ii) analysis using truth-functional connnectives and the ideas of predicates, individual terms, and functors.

  In the case of the latter sort of analysis, you might be asked to preserve pronouns, representing them using abstracts and variables. (You will not find questions of this sort in the exams before 2006, but your homework on this topic and exercise 2 for 6.2 provide further examples.)
- *Synthesis*. Again this might take two forms, depending on whether the expressions abbreviated by letters were are complete sentences or were terms, predicates, and functors—i.e., depending on whether the question is directed at ch. 5 or ch. 6.
- *Derivations*. Be able to construct derivations to show that entailments hold and to show that they fail. I may tell you in advance whether an entailment holds or leave it to you to check that using derivations. There will be some derivations where detachment and attachment rules may be used and where they will shorten the proof. But there will be others where you must rely on other rules, either because detachment and attachment rules do not apply or because I tell you not to use them. In particular be ready to use the rule RC (Rejecting a Conditional) from ch. 5.

  In the case of a derivation that includes forms involving predicates and functors, you won't be asked to present a counterexample if the derivation fails (though you will still need to be able to recognize that such a derivation has failed). In short, the test won't cover the new material introduced in 6.4.

F08 test 3 questions

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 John was invited, then he attended if he was free.

2. Unless we find the key, we'll get in only if we break the lock.

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

3. B → C ⊨ (A ∧ B) → C

4. ¬ (C → D) → (A → B) ⊨ A → D

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). Your analysis should be in reduced form (i.e., you *should not* use abstracts and variables), so be sure that the unanalyzed components of your answer are independent—in particular, that none contains a pronoun whose antecedent is in another. (Also be sure also that the individual terms you identify really are individual terms and are not quantifier phrases or general terms, like simple common nouns.)

5. Sam wrote to Linda, and she sent his book to him.

Analyze the sentence below using abstracts and variables to represent pronominal cross reference (instead of replacing pronouns by their antecedents). That is, use expanded form to the extent necessary so that each individual term in your analysis appears only as often as it appears in the original sentence. In other respects, your analysis should be as described for **5**.

6. The rock hit the road, but it didn't hit Oscar.

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. Ra(fb), fa = gb ⊨ a = b → (Rb(ga) ∧ fb = gb)

F08 test 3 answers

1. If John was invited, then he attended if he was free
John was invited → John attended if he was free
John was invited → (John attended ← John was free)

I → (A ← F)
I → (F → A)
if I then if F then A

A: John attended; F: John was free; I: John was invited

2. Unless we find the key, we'll get in only if we break the lock
¬ we will find the key → we'll get in only if we break the lock
¬ we will find the key → (¬ we'll get in ← ¬ we'll break the lock)

¬ F → (¬ G ← ¬ B)
¬ F → (¬ B → ¬ G)
if not F then if not B then not G

B: we'll break the lock; F: we will find the key; G: we'll get in

3.

	B → C	3
	│ A ∧ B	2
2 Ext	│ A	
2 Ext	│ B	(3)
3 MPP	│ C	(4)
	│ ●	
4 QED	│ C	1
1 CP	(A ∧ B) → C	

4.

	¬ (C → D) → (A → B)	3
	│ A	(6)
	│ │ ¬ D	(5)
	│ │ │ │ C → D	5
5 MTT	│ │ │ │ ¬ C	
	│ │ │ │ ○	¬ C, ¬ D, A ⊭ ⊥
	│ │ │ │ ⊥	4
4 RAA	│ │ │ ¬ (C → D)	3
	│ │ │ A → B	6
6 MPP	│ │ │ B	
	│ │ │ ○	B, ¬ D, A ⊭ ⊥
	│ │ │ ⊥	3
3 RC	│ │ ⊥	2
2 IP	│ D	1
1 CP	A → D	

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

The first interpretation lurks in the first gap and the last lurks in the second gap; middle interpretation lurks in both. It is enough to reach one of the two dead ends and to confirm one of the two counterexamples that lurk in that gap.

5. Sam wrote to Linda, and she sent his book to him

Sam wrote to Linda ∧ Linda sent Sam's book to him

Sam wrote to Linda ∧ Linda sent Sam's book to Sam

[_ wrote to _] Sam Linda ∧ [_ sent _ to _] Linda Sam's book Sam

Wsl ∧ Sl([_'s book] Sam)s

Wsl ∧ Sl(bs)s

S: [_ sent _ to _]; W: [_ wrote to _]; b: [_'s book]; l: Linda; s: Sam

6. The rock hit the road, but it didn't hit Oscar

The rock is such that (it hit the road, but it didn't hit Oscar)

$[x$ hit the road, but x didn't hit Oscar$]_x$ the rock

$[x$ hit the road ∧ x didn't hit Oscar$]_x$ the rock

$[x$ hit the road ∧ ¬ x hit Oscar$]_x$ the rock

$[Hxr \wedge \neg Hxo]_x k$

H: [_ hit _]; k: the rock; o: Oscar; r: the road

7.

	Ra(fb)	(3)
	fa = gb	a, b, fb, fa–gb, ga
	a = b	a–b, fb–fa–gb–ga
	●	
3 QED=	Rb(ga)	2
	●	
4 EC	fb = gb	2
2 Cnj	Rb(ga) ∧ fb = gb	1
1 CP	a = b → (Rb(ga) ∧ fb = gb)	

Phi 270 F06 test 3

F06 test 3 topics

The following are the topics to be covered. The proportion of the test covering each will approximate the proportion of the classes so far that have been devoted to that topic. Your homework and the collection of old tests will provide specific examples of the kinds of questions I might ask.

- *Analysis*. Two sorts of questions are possible here corresponding to the sorts of analyses you have done in chs. 5 and 6: (i) analysis by truth-functional connectives only, with atomic sentences as the ultimate components (the focus would, of course, be on conditionals—i.e., on the symbolic representation of if, only if, and unless) and (ii) analysis using truth-functional connnectives and the ideas of predicates, individual terms, and functors.

  In the case of the latter sort of analysis, you might be asked to represent pronouns using abstracts and variables. (You will not find questions of this sort in the old exams, but your homework on this topic and exercise 2 for 6.2 provide examples.)
- *Synthesis*. Again this might take two forms, depending on whether the expressions abbreviated by letters were are complete sentences or were terms, predicates, and functors.
- *Derivations*. Be able to construct derivations to show that entailments hold and to show that they fail. I may tell you in advance whether an entailment holds or leave it to you to check that using derivations. There will be some derivations where detachment and attachment rules may be used and where they will shorten the proof. But there will be others where you must rely on other rules, either because detachment and attachment rules do not apply or because I tell you not to use them. In particular be ready to use the rule RC (Rejecting a Conditional) from ch. 5.

  Remember that, if a derivation includes forms involving predicates and functors, presenting a counterexample will require the description of a structure and not merely an assignment of truth values. You will be allowed to use either tables or diagrams to describe structures.

F06 test 3 questions

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. There was an audience if there was food.

2. Sam went unless he had to work, but he enjoyed the ride only if the weather was good.

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

3. C → (B → A), C → B ⊨ C → A

4. A → B, C → D ⊨ C → (E → ¬ B)

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). Your analysis should be in reduced form (i.e., you *should not* use abstracts and variables), so be sure that the unanalyzed components of your answer are independent—in particular, that none contains a pronoun whose antecedent is in another. (Also be sure also that the individual terms you identify really are individual terms and are not quantifier phrases or general terms, like simple common nouns.)

5. Nancy phoned Oliver and told him about his promotion.

Analyze the following sentence using abstracts and variables to represent pronominal cross reference (instead of replacing pronouns by their antecedents). That is, each individual term in your analysis should appear only as often as it appears in the original sentence. In other respects, your analysis should be as described for **5**.

6. Spot finished chewing his bone, and he buried it in a flowerbed.

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. Ra(fb) ∧ ¬ Rc(fd), fb = fc ⊨ ¬ (a = c ∧ b = d)

F06 test 3 answers

1. There was an audience if there was food

there was an audience ← there was food

A ← F

F → A

if F then A

A: there was an audience; F: there was food

2. Sam went unless he had to work, but he enjoyed the ride only if the weather was good

Sam went unless he had to work ∧ Sam enjoyed the ride only if the weather was good

(Sam went ← ¬ Sam had to work) ∧ (¬ Sam enjoyed the ride ← ¬ the weather was good)

(N ← ¬ R) ∧ (¬ E ← ¬ G)

(¬ R → N) ∧ (¬ G ← ¬ E)

both if not R then N and if not G then not E

E: Sam enjoyed the ride; G: the weather was good; N: Sam went; R: Sam had to work

3.

	C → (B → A)	2
	C → B	3
	C	(2), (3)
2 MPP	B → A	4
3 MPP	B	(4)
4 MPP	A	(5)
	●	
5 QED	A	1
1 CP	C → A	

4.

	A → B	5
	C → D	2
	C	(2)
2 MPP	D	
	E	
	B	
	¬ A	
	○	¬ A, B, C, D, E ⊭ ⊥
	⊥	6
6 IP	A	5
	B	
	○	B, C, D, E ⊭ ⊥
	⊥	5
5 RC	⊥	4
4 RAA	¬ B	3
3 CP	E → ¬ B	1
1 CP	C → (E → ¬ B)	

A	B	C	D	E	A → B , C → D / C → (E → ¬ B)
T	T	T	T	T	Ⓣ Ⓣ Ⓕ F F
F	T	T	T	T	Ⓣ Ⓣ Ⓕ F F

The first interpretation lurks in the second gap while the second lurks in both

5. Nancy phoned Oliver and told him about his promotion

Nancy phoned Oliver ∧ Nancy told Oliver about his promotion

Nancy phoned Oliver ∧ Nancy told Oliver about his promotion

[_ phoned _] Nancy Oliver ∧ [_ told _ about _] Nancy Oliver Oliver's promotion

Pno ∧ Tno([_'s promotion] Oliver)

$$Pno \land Tno(po)$$

P: [_ phoned _]; T: [_ told _ about _]; n: Nancy; o: Oliver; p: [_'s promotion]

6. Spot finished chewing his bone, and he buried it in a flowerbed

Spot is such that (he finished chewing his bone, and he buried it in a flowerbed)

[x finished chewing x's bone, and x buried it in a flowerbed]$_x$ Spot

[x's bone is such that (x finished chewing it, and x buried it in a flowerbed)]$_x$s

[[x finished chewing y, and x buried y in a flowerbed]$_y$ x's bone]$_x$s

[[x finished chewing y ∧ x buried y in a flowerbed]$_y$([_'s bone] x)]$_x$s

$$[[Cxy \land Bxy]_y(bx)]_x s$$
$$\textit{or: } [[Cxy \land Bxy]_{xy} z(bz)]_z s$$

B: [_ buried _ in a flowerbed]; C: [_ finished chewing _]; b: [_'s bone]; s: Spot

(Note: a flowerbed is not an individual term so it must remain unanalyzed as part of a predicate)

7.

	$Ra(fb) \land \neg Rc(fd)$	1
	$fb = fc$	a, b, c, d, fb—fc, fd
1 Ext	$Ra(fb)$	(4)
1 Ext	$\neg Rc(fd)$	(4)
	$a = c \land b = d$	3
3 Ext	$a = c$	a—c, b, d, fb—fc, fd
3 Ext	$b = d$	a—c, b—d, fc—fb—fd
	●	
4 Nc=	⊥	2
2 RAA	$\neg (a = c \land b = d)$	

Phi 270 F05 test 3

F05 test 3 topics

The following are the topics to be covered. The proportion of the test covering each will approximate the proportion of the classes so far that have been devoted to that topic. Your homework and the collection of old tests will provide specific examples of the kinds of questions I might ask.

- *Analysis.* Two sorts of questions are possible here corresponding to the sorts of analyses you have done in chs. 5 and 6: (i) analysis by truth-functional connnectives alone, with atomic sentences as the ultimate components (the emphasis will, of course, be on conditionals—i.e., on the symbolic representation of if, only if, and unless) and (ii) analysis using not only truth-functional connnectives but also predicates, individual terms, and functors.
- *Derivations.* Be able to construct derivations to show that entailments hold and to show that they fail. I may tell you in advance whether an entailment holds or leave it to you to check that using derivations. There may be some derivations where detachment and attachment rules may be used and where they will shorten the proof. But there will be others where you must rely on other rules, either because detachment and attachment rules do not apply or because I tell you not to use them. In particular, be ready to use the rule RC (Rejecting a Conditional) from ch. 5.

  Remember that, if a derivation involves predicates and functors, presenting a counterexample will require the description of a structure and not merely an assignment of truth values. You will be allowed to use either tables or diagrams to describe structures.

F05 test 3 questions

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.

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

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

3. $A \to (B \to C), C \to D \vDash B \to (A \to D)$

4. $(C \land A) \to B \vDash (A \land B) \to C$

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.

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

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. $Rb(fa), fb = gc, c = fb, d = gc \vDash c = d \land (a = b \to Ra(gd))$

F05 test 3 answers

1. If the part was fixed, it broke again

the part was fixed → the part broke again

$$F \to B$$

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)

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

if not T then if not P then not G

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

3.

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

4.

	$(C \land A) \to B$	4
	$A \land B$	2
2 Ext	A	(7)
2 Ext	B	
	$\neg C$	
	$\neg C$	
	○	$A, B, \neg C \nvDash \bot$
	⊥	6
6 IP	C	5
	●	
7 QED	A	5
5 Cnj	$C \land A$	4
	B	
	○	$A, B, \neg C \nvDash \bot$
	⊥	4
4 RC	⊥	3
3 IP	C	1
1 CP	$(A \land B) \to C$	

A	B	C	(C ∧ A) → B	/	(A ∧ B) → 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

$$f = m \lor Ofb$$

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))
```

Phi 270 F04 test 3

F04 test 3 topics

The following are the topics to be covered. The proportion of the test covering each will approximate the proportion of the classes so far that have been devoted to that topic. Your homework and the collection of old tests will provide specific examples of the kinds of questions I might ask.

- *Analysis.* Two sorts of questions are possible here corresponding to the sorts of analyses you have done in chs. 5 and 6: (i) analysis by truth-functional connnectives only with atomic sentences as the ultimate components (the focus would, of course, be on conditionals—i.e., on the symbolic representation of if, only if, and unless) and (ii) analysis using truth-functional connnectives and the ideas of predicates, individual terms, and functors.
- *Synthesis.* You may be given a symbolic form and an interpretation of its non-logical vocabulary and asked to express the sentence in English. This form might be either a truth-functional compound of unanalyzed component sentences or a form built using predicates, individual terms, and functors as well as connectives.
- *Derivations.* Be able to construct derivations to show that entailments hold and to show that they fail. I may tell you in advance whether an entailment holds or leave it to you to check that using derivations. There will be some derivations where detachment and attachment rules may be used and where they will shorten the proof. But there will be others where you must rely on others rules, either because detachment and attachment rules do not apply or because I tell you not to use them. In particular be ready to use the rule RC (Rejecting a Conditional) from ch. 5.

  Remember that, if a derivation includes forms involving predicates and functors, presenting a counterexample will require the description of a structure and not merely an assignment of truth values. You will be allowed to use either tables or diagrams to describe structures.

F04 test 3 questions

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. Dan wasn't home unless it was a holiday.

2. If ten days had passed, then the return was accepted only if the item was damaged.

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

3. A → (B → ¬ C) ⊨ C → (B → ¬ A)

4. A → B ⊨ B → C

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. Ann called Bill and he picked her up at the garage.

6. If Carol's father is Dave's boss, then she has either met Dave or heard her father speak of him.

Use a derivation to show that the entailment below holds. You may use detachment and attachment rules. (Be sure to indicate the alias sets at each stage when they change.)

7. a = fc, b = fd, Rac ⊨ c = d → Rbd

F04 test 3 answers

1. Dan wasn't home unless it was a holiday

Dan wasn't home ← ¬ it was a holiday

¬ Dan was home ← ¬ it was a holiday

¬ H ← ¬ D

¬ D → ¬ H

if not D then not H

H: Dan was home; D: it was a holiday

2. If ten days had passed, then the return was accepted only if the item was damaged

ten days had passed → the return was accepted only if the item was damaged

ten days had passed → (¬ the return was accepted ← ¬ the item was damaged)

T → (¬ A ← ¬ D)

T → (¬ D → ¬ A)

if T then if not D then not A

T: ten days had passed; D: the item was damaged; A: the return was accepted

3.

```
           │A → (B → ¬ C)   4
           ││C              (6)
           │││B             (5)
           ││││A            (4)
 4 MPP     ││││B → ¬ C      5
 5 MPP     ││││¬ C          (6)
           ││││●
 6 Nc      ││││⊥            3
 3 RAA     │││¬ A           2
 2 CP      ││B → ¬ A        1
 1 CP      │C → (B → ¬ A)
```

4.

```
           │A → B           3
           ││B
           │││¬ C
           ││││¬ A
           ││││○            ¬ A, B, ¬ C ⊭ ⊥
           ││││⊥            4
 4 IP      │││A             3
           │││
           ││││B
           ││││○            B, ¬ C ⊭ ⊥
           ││││⊥            3
 3 RC      │││⊥             2
 2 IP      ││C              1
 1 CP      │B → C
```

A	B	C	A → B / B → C
T	T	F	Ⓣ Ⓕ
F	T	F	Ⓣ Ⓕ

The first counterexample lurks in the second gap and the second one lurks in both

5. Ann called Bill and he picked her up at the garage

Ann called Bill ∧ Bill picked Ann up at the garage

[_ called _] Ann Bill ∧ [_ picked _ up at _] Bill Ann the garage

Cab ∧ Pbag

C: [_ called _]; P: [_ picked _ up at _]; a: Ann; b: Bill; g: the garage

6. If Carol's father is Dave's boss, then she has either met Dave or heard her father speak of him

Carol's father is Dave's boss → Carol has either met Dave or heard her father speak of him

Carol's father = Dave's boss → (Carol has met Dave ∨ Carol has heard her father speak of Dave)

[_'s father] Carol = [_'s boss] Dave → (Carol has met Dave ∨ Carol has heard Carol's father speak of Dave)

fc = bd → ([_ has met _] Carol Dave ∨ [_ has heard _ speak of _] Carol Carol's father Dave)

fc = bd → (Mcd ∨ Hc(fc)d)

M: [_ has met _]; H: [_ has heard _ speak of _]; f: [_'s father]; b: [_'s boss]; c: Carol; d: Dave

7.

```
          │a = fc
          │b = fd          a-fc, b-fd, c, d
          │Rac             (2)
          ├──
          ││c = d         a-fc-b-fd, c-d
          │├──
          ││●
          ││
2 QED=    ││Rbd            1
1 CP      │c = d → Rbd
```

Phi 270 F03 test 3

F03 test 3 topics

The following are the topics to be covered. The proportion of the test covering each will approximate the proportion of the classes so far that have been devoted to that topic. Your homework and the collection of old tests will provide specific examples of the kinds of questions I might ask.

- *Analysis.* Two sorts of questions are possible here corresponding to the sorts of analyses you have done in chs. 5 and 6: (i) analysis by truth-functional connnectives only with atomic sentences as the ultimate components (the focus would, of course, be on conditionals--i.e., on the symbolic representation of if, only if, and unless), (ii) analysis using truth-functional connnectives *and* the ideas of predicates, individual terms, and functors.
- *Synthesis.* You may be given a symbolic form and an interpretation of its non-logical vocabulary and asked to express the sentence in English. This form might be either a truth-functional compound of unanalyzed component sentences or a form built from predicates, individual terms, and functors.
- *Derivations.* Be able to construct derivations to show that entailments hold and to show that they fail. I may tell you in advance whether an entailment holds or leave it to you to check that using derivations. There will be some derivations where detachment and attachment rules may be used and where they will shorten the proof. But there will be others where you must rely on others rules, either because detachment and attachment rules do not apply or because I tell you not to use them. In particular be ready to use the rule RC (Rejecting a Conditional) from ch. 5.

  Remember that, if a derivation, includes forms built using predicates presenting a counterexample will require the description of a structure and not merely an assignment of truth values.

F03 test 3 questions

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

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

Use derivations to checkwhether each of the entailments below holds. You may use detachment and attachment rules. If an entailment fails, confirm a counterexample that lurks in an open gap.

3. A → ¬ C, B → C ⊨ A → ¬ B

4. (A ∧ B) → C ⊨ B → (¬ C → A)

Analyze the sentences 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

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

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

7. a = b ∧ Rac ⊨ fa = c → Rb(fb)

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 → ¬ 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)

¬ B → (¬ G ← ¬ K)

¬ B → (¬ K → ¬ 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

[_ asked _ to drive _ to _] Sam Tom Sam the meeting → Sam = the person who called earlier

Astsm → s = p

A: [_ asked _ to drive _ to _]; 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

[_ called _] Dave's father the mother of the child who hit Dave

C([_'s father] Dave)([the mother of _](the child who hit Dave))

C(fd)(m([the child who hit _]d))

C(fd)(m(hd))

C: [_ called _]; d: Dave; f: [_'s father]; h: [the child who hit _]; m: [the mother of _]

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)
```

Phi 270 F02 test 3

F02 test 3 questions

Analyze the sentences below in as much detail as possible *using 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. They'll be here soon unless they had car trouble

2. If it snowed, then the schools were open only if the plows got out early.

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

3. A → (¬ B → C) ⊨ ¬ C → (A → B)

4. A → (¬ B → C) ⊨ C → (A → B)

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. Al is Bob's father and Bob works for him

Synthesize an English sentence with the following logical form:

6. Sa(mb) → ¬ S(ma)b

S: [_ went to school with _]; a: Al; b: Bob; m: [_'s mother]

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

7. Fa → C, Fb ⊨ a = b → C

F02 test 3 answers

1. They'll be here soon unless they had car trouble

They'll be here soon ← ¬ they had car trouble

S ← ¬ T [*or:* ¬ T → S]

if not T then S

S: they'll be here soon; T: they had car trouble

2. If it snowed, then the schools were open only if the plows got out early

it snowed → the schools were open only if the plows got out early

it snowed → (¬ the schools were open ← ¬ the plows got out early)

S → (¬ O ← ¬ E) [*or:* S → (¬ E → ¬ O)]

if S then if not E then not O

E: the plows got out early; O: the schools were open; S: it snowed

3.

	A → (¬ B → C)	3
	¬ C	(4)
	A	(3)
3 MPP	¬ B → C	4
4 MTT	B	(5)
	●	
5 QED	B	2
2 CP	A → B	1
1 CP	¬ C → (A → B)	

4.

	A → (¬ B → C)	3
	C	
	A	(3)
3 MPP	¬ B → C	5
	¬ B	(5)
5 MPP	C ○	A, ¬ B, C ⊭ ⊥
	⊥	4
4 IP	B	2
2 CP	A → B	1
1 CP	C → (A → B)	

A B C	A → (¬ B → C) / C → (A → B)
T F T	ⓣ T T ⓕ F

5. Al is Bob's father and Bob works for him

Al is Bob's father ∧ Bob works for Al

Al = Bob's father ∧ [_ works for _] Bob Al

a = [_'s father] Bob ∧ Wba

a = fb ∧ Wba

W: [_ works for _]; a: Al; b: Bob; f: [_'s father]

6. S Al ([_'s mother] Bob) → ¬ S ([_'s mother] Al) Bob

[_ went to school with _] Al Bob's mother → ¬ [_ went to school with _] Al's mother Bob

Al went to school with Bob's mother → ¬ Al's mother went to school with Bob

Al went to school with Bob's mother → Al's mother didn't go to school with Bob

If Al went to school with Bob's mother, then Al's mother didn't go to school with Bob

7.

	Fa → C	3
	Fb	(4)
	a = b	a-b
	¬ C	(3)
3 MTT	¬ Fa	(4)
	●	
4 Nc=	⊥	2
2 IP	C	1
1 CP	a = b → C	

Phi 270 F00 test 3

F00 test 3 questions

Analyze the sentences below in as much detail as possible *using 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 rains, you will get wet if you're outside

2. Al missed breakfast only if he overslept

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

3. A → (B → C) ⊨ (A → ¬ C) → (A → ¬ B)

4. A → B ⊨ ¬ A ∧ B

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. Unless Al is the file's owner, the system didn't let him open it

Expand the following sentence in all possible ways on each of the terms appearing in it (i.e., you need not use vacuous abstraction).

6. Tabc

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

7. A → Ra(fb), Rb(fa) → Ga ⊨ A → (¬ Gb → ¬ a = b)

F00 test 3 answers

1. it will rain → you will get wet if you're outside

it will rain → (you will get wet ← you will be outside)

R → (W ← O) [*or:* R → (O → W)]

if R then if O then W

O: you will be outside; R: it will rain; W: you will get wet

2. ¬ Al missed breakfast ← ¬ Al overslept

¬ M ← ¬ O [*or:* ¬ O → ¬ M)]

if not O then not M

M: Al missed breakfast; O:Al overslept

3.

```
        │A → (B → C)            3
        ││A → ¬ C               4
        │││A                    (3),(4)
3 MPP   │││B → C                5
4 MPP   │││¬ C                  (5)
5 MTT   │││¬ B                  (6)
        │││●
6 QED   │││¬ B                  2
2 CP    ││A → ¬ B               1
1 CP    │(A → ¬ C) → (A → ¬ B)
```

4.

```
        │A → B      3,5
        │││A        (3)
3 MPP   │││B
        │││○        A, B ⊭ ⊥
        │││⊥        2
2 RAA   ││¬ A       1
        │││¬ B      (5)
5 MTT   │││¬ A
        │││○        ¬ A, ¬ B ⊭ ⊥
        │││⊥        4
4 IP    ││B         1
1 Cnj   │¬ A ∧ B
```

A	B	A → B	/	¬ A ∧ B
T	T	Ⓣ		F Ⓕ
F	F	Ⓣ		T Ⓕ

The counterexample in the first row lurks in the first gap and the one in the second row lurks in the second gap.

5. ¬ Al is the file's owner → the system didn't let Al open the file

¬ Al is the file's owner → ¬ the system let Al open the file

¬ Al = the file's owner → ¬ [_ let _ open _] the system Al the file

¬ a = [_'s owner] the file → ¬ Lsaf

¬ a = of → ¬ Lsaf

L: [_ let _ open _]; a: Al; f: the file; o: [_'s owner]; s: the system

6. $[Txbc]_x a$

$[Taxc]_x b$

$[Tabx]_x c$

7.

```
          │A → Ra(fb)
          │Rb(fa) → Ga          4
          ││A
          ││Ra(fb)              (5)
          │││¬ Gb               (6)
          ││││a=b               a-b, fa-fb
          │││││●
5 QED=    │││││Rb(fa)          4
          │││││Ga              (6)
          │││││●
6 Nc=     │││││⊥               4
4 RC      ││││⊥                3
3 RAA     │││¬ a=b             2
2 CP      ││¬ Gb → ¬ a=b       1
1 CP      │A → (¬ Gb → ¬ a=b)
```

Phi 270 F99 test 3

F99 test 3 questions

Analyze the sentences below in as much detail as possible *using connectives*; that is, you need 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. We won't have the material by Thursday unless the order goes in today.
2. If the power went out, they finished the job only if they had a generator.

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

3. A → (¬ B → C) , C → D ⊨ A → (¬ D → B)
4. (A ∧ B) → (C ∨ D) ⊨ A → C

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. Adam called Billy's mother and she is the owner of the dog.

Expand the following sentence in all possible ways on each of the terms appearing in it (i.e., you need not use vacuous abstraction).

6. Rab → Rbc

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

7. a = fb, Ra(fa) ⊨ fb = c → R(fb)(fc)

F99 test 3 answers

1. We won't have the material by Thursday unless the order goes in today

we won't have the material by Thursday ← ¬ the order will go in today

¬ we will have the material by Thursday ← ¬ the order will go in today

¬ H ← ¬ T [*or:* ¬ T → ¬ H]

if not T then not H

H: we will have the material by Thursday; T: the order will go in today

2. If the power went out, they finished the job only if they had a generator

the power went out → they finished the job only if they had a generator

the power went out → (¬ they finished the job ← ¬ they had a generator)

O → (¬ F ← ¬ G) [*or:* O → (¬ G → ¬ F)]

if O then if not G then not F

F: they finished the job; G:they had a generator; O: the power went out

3.

```
        │A → (¬ B → C)   3
        │C → D           4
        ││A              (3)
        │││¬ D           (4)
3 MPP   │││¬ B → C       5
4 MTT   │││¬ C           (5)
5 MTT   │││B             (6)
        │││●
6 QED   │││B             2
2 CP    ││¬ D → B        1
1 CP    │A → (¬ D → B)
```

4.

```
        │(A ∧ B) → (C ∨ D)   3
        ││A                  (5)
        │││¬ C               (8)
        ││││●
5 QED   ││││A                4
        │││││¬ B
        │││││○               A, ¬ B, ¬ C ⊭ ⊥
        │││││⊥               6
6 IP    ││││B                4
4 Cnj   │││A ∧ B             3
        ││││C ∨ D            8
8 MTP   ││││D
        ││││○                A, ¬ C, D ⊭ ⊥
        ││││⊥                3
3 RC    │││⊥                 2
2 IP    ││C                  1
1 CP    │A → C
```

A	B	C	D	(A ∧ B)	→	(C ∨ D)	/	A → C	
T	F	F	F	F	Ⓣ	F		Ⓕ	lurks in 1st gap
T	F	F	T	F	Ⓣ	T		Ⓕ	lurks in both gaps
T	T	F	T	T	Ⓣ	T		Ⓕ	lurks in 2nd gaps

5. Adam called Billy's mother and she is the owner of the dog

Adam called Billy's mother ∧ Billy's mother is the owner of the dog

[_ called _] Adam Billy's mother ∧ Billy's mother = the owner of the dog

Ca(Billy's mother) ∧ Billy's mother = the owner of the dog

Ca([_'s mother] Billy) ∧ [_'s mother] Billy = [the owner of _] the dog

Ca(mb) ∧ mb = od

C: [_ called _]; a: Adam; b: Billy; d: the dog; m: [_'s mother]; o: [the owner of _]

6. Apart from the choice of the bound variable, the following are all the possibilities:

$[Rxb \to Rbc]_x a$ $[Rax \to Rbc]_x b$ $[Rab \to Rbx]_x c$

$[Rab \to Rxc]_x b$

$[Rax \to Rxc]_x b$

7.

	a = fb Ra(fa)	a-fb, b, c, fa, fc (2)
	fb = c	a-fb-c, b, fa-fc
	●	
2 QED=	R(fb)(fc)	1
1 CP	fb = c → R(fb)(fc)	

Phi 270 F98 test 3

F98 test 3 questions

(Questions 1-6 are from quiz 3 and 7-10 are from quiz 4 out of 6 quizzes—these two quizzes addressed the part of the course your test is designed to cover.)

Analyze the sentences below in as much detail as possible *without* going below the level of sentences (i.e., without recognizing individual terms and predicates). Be sure that the unanalyzed components of your answer are complete and independent sentences and that you respect any grouping in the English. You may use right-to-left arrows to reflect English word order but you should then also restate your symbolic analysis with arrows running left to right and, in any case, you should restate it using English notation.

1. If our message got there, they should be on their way
2. Unless we make reservations, we'll get a table only if it is a slow night

3. Check the following for validity using derivations; you *may use* attachment rules and detachment rules. If the derivation fails, confirm a counterexample that lurks in an open gap.

A → (B → (C ∨ D))

¬ C → (A → ¬ B)

4. [This question was on a topic not covered this year]

5. Analyze the sentence below in as much detail as possible, continuing the analysis when there are no more connectives by identifying predicates, functors, and individual terms. Be sure that the unanalyzed expressions in your answer are independent and that you respect any grouping in the English. (You need not state the result in English notation.)

If Sam is the winner of the trip, then the winner of the grand prize presented it to him

6. Give two different expansions (using predicate abstracts) of the sentence below as a one-place predicate applied to a term:

Pb ∧ Rab

7. Draw a diagram which presents the same interpretation as the following tables:

range: 1, 2, 3

a	c	g
2	3	2

τ	Fτ
1	T
2	F
3	T

τ	Gτ
1	F
2	T
3	T

R	1	2	3
1	T	F	T
2	T	F	F
3	F	T	T

8. Describe a structure (i.e., an assignment of extensions to the non-logical vocabulary) which makes the following sentences all true. (You may present the structure either using tables or using diagrams.)

fa = b, b = c, Pb, ¬ Pa, Ra(fa), R(fb)(fc), ¬ Rbc

Check each of the arguments below for validity using derivations. You need *not* present counterexamples to gaps that reach dead ends.

9.

fa = c
Rbc

a = b → Ra(fa)

10.

Rab ∨ Rcb
a = b ∧ gb = gc

Rbc → Rcb

F98 test 3 answers

1. If our message got there, they should be on their way

our message got there → they should be on their way

M → W

if M then W

M: our message got there; W: they should be on their way

2. ¬ we will make reservations → we'll get a table only if it is a slow night

¬ we will make reservations → (¬ we'll get a table ← ¬ it will be a slow night)

¬ R → (¬ T ← ¬ S) ***or:*** ¬ R → (¬ S → ¬ T)

if not R then if not S then not T

R: we will make reservations; S: it will be a slow night; T: we'll get a table

3.

	A → (B → (C ∨ D))	4
	¬ C	(6)
	A	(4)
	B	(5)
4 MPP 5 MPP 6 MTP	B → (C ∨ D) C ∨ D D ○	5 6 A, B, ¬ C, D ⊭ ⊥
	⊥	
3 RAA	¬ B	2
2 CP	A → ¬ B	1
1 CP	¬ C → (A → ¬ B)	

A	B	C	D	A	→	(B	→	(C	∨	D))	/	¬	C	→	(A	→	¬	B)
T	T	F	T		Ⓣ		T		T			T		Ⓕ		F	F	

4. [This question was on a topic not covered this year]

5. If Sam is the winner of the trip, then the winner of the grand prize presented it to him

Sam is the winner of the trip → the winner of the grand prize presented the trip to Sam

s = the winner of the trip → [_ presented _ to _]the winner of the grand prize the trip Sam

s = [the winner of _] the trip → P(the winner of the grand prize)ts

s = nt → P([the winner of _] the grand prize)ts

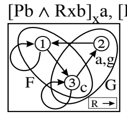
s = nt → P(ng)ts

P: [_ presented _ to _]; g: the grand prize; n: [the winner of _]; s: Sam; t: the trip

6. The following are the possibilities; in the last, τ may be any term:

$[Pb \land Rxb]_x a$, $[Px \land Rab]_x b$, $[Pb \land Rax]_x b$, $[Px \land Rax]_x b$, $[Pb \land Rab]_x \tau$

7.



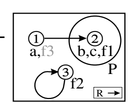
8. range: 1, 2, 3

a	b	c
1	2	2

τ	fτ
1	2
2	3
3	1

τ	Pτ
1	F
2	T
3	F

R	1	2	3
1	F	T	F
2	F	F	F
3	F	F	T



(The diagram above provides a complete answer, and so do the tables to its left. The tables below show a way of arriving at these answers.)

alias sets	*IDs*	*values*
a	1	a: 1
fa	2	f1: 2
b		b: 2
c		c: 2
fb	3	f2: 3
fc		f2: 3

resources	*values*
Pb	P2: **T**
¬ Pa	P1: **F**
Ra(fa)	R12: **T**
R(fb)(fc)	R33: **T**
¬ Rbc	R22: **F**

9.

	fa = c Rbc	a, b, fa—c, fb (2)
	a = b	a—b, fa—fb—c
	●	
2 QED=	Ra(fa)	1
1 CP	a = b → Ra(fa)	

10.

	Rab ∨ Rcb	4
	a = b ∧ gb = gc	2
	Rbc	
2 Ext	a = b	a—b,c,gb,gc
2 Ext	gb = gc	a—b,c,gb—gc
	¬ Rcb	(4)
4 MTP	Rab	
	○	a=b,gb=gc,Rbc,¬Rcb,Rab ⊭ ⊥
	⊥	3
3 CP	Rcb	1
1 CP	Rbc → Rcb	

Phi 270 F97 test 3

F97 test 3 questions

(Questions 1-6 are from quiz 3 and 7-9 are from quiz 4 out of 6 quizzes—these two quizzes addressed the part of the course your test is designed to cover.)

Analyze the sentences below in as much detail as possible *without* going below the level of sentences (i.e., without recognizing individual terms and predicates). Be sure that the unanalyzed components of your answer are complete and independent sentences and that you respect any grouping in the English.

1. The creek will be high enough only if it rains.
2. Unless you object, Al will show the letter to Barb if she asks to see it.

Check each of the following for validity using the basic system of derivations (i.e., *do not use* attachment rules but *you may use* detachment rules). If a derivation fails, confirm a counterexample that lurks in an open gap.

3. A → (B ∨ C) / ¬ C → (A → B)
4. A → (B → C) / (C ∧ A) → B
5. Analyze the sentence below in as much detail as possible, continuing the analysis when there are no more connectives by identifying predicates, functors, and individual terms. Be sure that the unanalyzed expressions in your answer are independent and that you respect any grouping in the English.
   If Dan's wife received the message, she is the person who called.
6. **a.** Give two different expansions (using predicate abstracts) of the sentence: Raba.
   b. Put the following into reduced form: $[Pxa \wedge Qbx]_x a$.
7. Describe a structure (i.e., an assignment of extensions to the non-logical vocabulary) which makes the following sentences all true. (You may present the structure either using tables or, were possible, using diagrams.)
   a = fb, fa = fb, b = c, Fa, ¬ F(gc), Rb(fa), ¬ Ra(fb), R(gc)c

Use derivations to check each of the claims of entailment below. You need *not* present counterexamples to dead-end gaps.

8. Fa ∧ ¬ Fb ⊨ b = c → ¬ a = c
9. fa = c, fb = c, Rc(fa) → Ra(fa) ⊨ R(fa)(fb) → Rb(fb)

F97 test 3 answers

1. the creek will be high enough only if it rains

¬ the creek will be high enough ← ¬ it will rain

¬ H ← ¬ R ***or*** ¬ R → ¬ H

if not R then not H

H: the creek will be high enough; R: it will rain

2. ¬ you will object → Al will show the letter to Barb if she asks to see it

¬ you will object → (Al will show the letter to Barb ← Barb will ask to see the letter)

¬ O → (S ← A) ***or*** ¬ O → (A → S)

if not O then if A then S

A: Barb will ask to see the letter; O: you will object; S: Al will show the letter to Barb

3.

	A → (B ∨ C)	3
	¬ C	(4)
	A	(3)
3 MPP	B ∨ C	4
4 MTP	B	(5)
	●	
5 QED	B	2
2 CP	A → B	1
1 CP	¬ C → (A → B)	

4.

	A → (B → C)	3
	C ∧ A	2
2 Ext	C	
2 Ext	A	(3)
3 MPP	B → C	5
	¬ B	
	¬ B	
	○	A,¬ B,C ⊭ ⊥
	⊥	6
6 IP	B	5
	C	
	○	A,¬ B,C ⊭ ⊥
	⊥	5
5 RC	⊥	4
4 IP	B	1
1 CP	(C ∧ A) → B	

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

5. Dan's wife received the message → Dan's wife is the person who called

[_ received _] Dan's wife the message → Dan's wife = the person who called

R(Dan's wife)m → [_'s wife] Dan = p

R(fd)m → fd = p

R: [_ received _]; d: Dan; f: [_'s wife]; m: the message; p: the person who called

6. **a.** The following are the possibilities; in the last, τ may be any term:

$[Rxbx]_x a$, $[Rxba]_x a$, $[Rabx]_x a$, $[Raxa]_x b$, $[Raba]_x \tau$

b. Paa ∧ Qba

7. range: 1, 2, 3

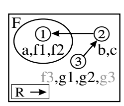
a	b	c
1	2	2

τ	fτ
1	1
2	1
3	3

τ	gτ
1	3
2	3
3	3

τ	Fτ
1	T
2	F
3	F

R	1	2	3
1	F	F	F
2	T	F	F
3	T	T	F



(The diagram at the left provides a complete answer, and so do the tables above. The tables below show a way of arriving at these answers.)

alias sets	*IDs*	*values*
a	1	a: 1
fa		f1: 1
fb		f2: 1
b	2	b: 2
c		c: 2
gc	3	g2: 3

resources	*values*
Fa	F1: **T**
¬ F(gc)	F3: **F**
Rb(fa)	R21: **T**
¬ Ra(fb)	R11: **F**
R(gc)c	R32: **T**

8.

	Fa ∧ ¬ Fb	1
1 Ext	Fa	(4)
1 Ext	¬ Fb	(4)
	b = c	a,b-c
	a = c	a-b-c
	●	
4 Nc=	⊥	3
3 RAA	¬ a = c	2
2 CP	b = c → ¬ a = c	

9.

	fa = c	
	fb = c	a,b,c-fa-fb
	Rc(fa) → Ra(fa)	3
	│ R(fa)(fb)	(4)
	│ │ ¬ Rb(fb)	
	│ │ │ ●	
4 QED=	│ │ │ Rc(fa)	3
	│ │ │ Ra(fa)	
	│ │ │ ○	fa=c,fb=c,R(fa)(fb), ¬Rb(fb),Ra(fa) ⊭ ⊥
	│ │ │ ⊥	3
3 RC	│ │ ⊥	2
2 IP	│ Rb(fb)	1
1 CP	R(fa)(fb) → Rb(fb)	

Phi 270 F96 test 3

F96 test 3 questions

(Questions 1-6 are from quiz 3 and 7-9 are from quiz 4 out of 6 quizzes—these two quizzes addressed the part of the course your test is designed to cover.)

Analyze the sentences below in as much detail as possible *without* going below the level of sentences (i.e., without recognizing individual terms and predicates). Be sure that the unanalyzed components of your answer are complete and independent sentences and that you respect any grouping in the English.

1. You won't succeed unless you try.
2. If it was after 5, Sam got in only if he had a key.

Check each of the following claims of entailment using the basic system of derivations (i.e., *do not use* attachment rules but *you may use* detachment rules). If a derivation fails, confirm a counterexample that lurks in an open gap.

3. (A ∧ B) → C ⊨ A → C
4. C → (A → B) ⊨ (A ∧ ¬ B) → ¬ C

5. Analyze the sentence below in as much detail as possible, continuing the analysis when there are no more connectives by identifying predicates, functors, and individual terms. Be sure that the unanalyzed expressions in your answer are independent and that you respect any grouping in the English.

If Ann's car is the one you saw, she wasn't driving it.

6. **a.** Give two different expansions (using predicate abstracts) of the reduced form: Raa.
   b. Put the following into reduced form: $[Fx \wedge Pxb]_x c$.
7. Describe a structure (i.e., an assignment of extensions to the non-logical vocabulary) which makes the following sentences all true. (You may present the structure either using tables or, where possible, using diagrams.)

a = c, ga = gb, Pa, ¬ P(ga), Rab, Rbc, ¬ Rc(ga)

Check each of the claims of entailment below using derivations. You need *not* describe counterexample lurking in gaps you leave open.

8. Ha ∧ c = d, G(fd) ⊨ G(fc) ∧ (a = b → Hb)
9. Ra(fa) ∧ Rb(fb), fa = b ⊨ Ra(f(fa))

F96 test 3 answers

1. You won't succeed unless you try

you won't succeed ← ¬ you will try

¬ you will succeed ← ¬ you will try

¬ S ← ¬ T ***or*** ¬ T → ¬ S

if not T then not S

S: you will succeed; T: you will try

2. If it was after 5, Sam got in only if he had a key

it was after 5 → Sam got in only if he had a key

it was after 5 → (¬ Sam got in ← ¬ Sam had a key)

A → (¬ G ← ¬ K) ***or*** A → (¬ K → ¬ G)

if A then if not K then not G

A: it was after 5; G: Sam got in; K: Sam had a key

3.

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

A	B	C	(A ∧ B) → C / A → C
T	F	F	F Ⓣ Ⓕ

4.

	C → (A → B)	4
	│ A ∧ ¬ B	2
2 Ext	│ A	(5)
2 Ext	│ ¬ B	(6)
	│ │ C	(4)
4 MPP	│ │ A → B	5
5 MPP	│ │ B	(6)
	│ │ ●	
6 Nc	│ │ ⊥	3
3 RAA	│ ¬ C	1
1 CP	(A ∧ ¬ B) → ¬ C	

5. If Ann's car is the one you saw, she wasn't driving it

Ann's car is the one you saw → ¬ Ann was driving Ann's car

Ann's car = the car you saw → ¬ [_ was driving _] Ann (Ann's car)

[_'s car] Ann = [the car _ saw] you → ¬ Da([_'s car] Ann)

ca = ro → ¬ Da(ca)

D: [_ was driving _]; a: Ann; c: [_'s car]; o: you; r: [the car _ saw]

[ca = ro → ¬ Da(ro) is also a possible interpretation of the pronoun's reference; the analysis is equivalent to the analysis one but would probably have different implicatures]

6. a. The following are the possibilities; in the last, τ may be any term:

$[Rxx]_x a$, $[Rxa]_x a$, $[Rax]_x a$, $[Raa]_x \tau$

b. Fc ∧ Pcb

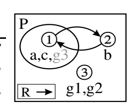
7. range: 1, 2, 3

a	b	c
1	2	1

τ	gτ
1	3
2	3
3	1

τ	Pτ
1	T
2	F
3	F

R	1	2	3
1	F	T	F
2	T	F	F
3	F	F	F



(The diagram provides a complete answer, and so do the tables to its left. The tables below show a way of arriving at these answers.)

alias sets	*IDs*	*values*
a	1	a: 1
c		c: 1
b	2	b: 2
ga	3	g1: 3
gb		g2: 3

resources	*values*
Pa	P1: **T**
¬ P(ga)	P3: **F**
Rab	R12: **T**
Rbc	R21: **T**
¬ Rc(ga)	R13: **F**

8.

	Ha ∧ c = d	
	G(fd)	(3)
1 Ext	Ha	(5)
1 Ext	c = d	a,b,c-d,fc-fd
	│ ●	
3 QED=	│ G(fc)	2
	│ │ a = b	a-b,c-d,fc-fd
	│ │ ●	
5 QED=	│ │ Hb	4
4 CP	│ a = b → Hb	2
2 Cnj	G(fc) ∧ (a = b → Hb)	

9.

	Ra(fa) ∧ Rb(fb)	1
	fa = b	a,b-fa,fb-f(fa)
1 Ext	Ra(fa)	
1 Ext	Rb(fb)	
	¬ Ra(f(fa))	
	○	fa=b,Ra(fa),Rb(fb),¬Ra(f(fa)) ⊭ ⊥
	⊥	2
2 IP	Ra(f(fa))	