Phi 270 F10 test 2

F10 test 2 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.* Be able to analyze the logical form of a sentence as fully as possible using conjunction, negation, and disjunction and present the form in both symbolic and English notation.
- *Synthesis.* Be able to synthesize an English sentence that has a given logical form.
- *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 a derivation where attachment rules (Adj and Wk) and detachment rules (MTP and MPT) may be used and where they will shorten the proof; but there will be other derivations where you must rely on the basic rules, either because detachment and attachment rules do not apply or because I tell you not to use them.

F10 test 2 questions

Analyze each sentence below in as much detail as possible, presenting the result in *both symbols and English notation* (i.e., both using symbolic notion, such as '∧', and using the notation, such as 'both … and', that employs English words). Provide a key to your abbreviations of unanalyzed components, and be sure that they are complete and independent sentences. Try to respect any grouping in the English.

1. Al presented his suggestion but didn't get both the management and the union to agree to it.

2. Either Bob didn't make the call or neither Carol nor Dave was home

Synthesize an English sentence (the more idiomatic the better) that has the following analysis:

3. $(E \wedge \neg F) \vee (\neg E \wedge F)$

(E: Dave contacted Ed; F: Dave contacted Fred)

Use derivations to check whether each of the claims of entailment below holds. If one fails, present a counterexample by providing a table in which you calculate the truth values of the premises and conclusion on an extensional interpretation (i.e., an assignment of truth values) that divides an open gap. (Your table should indicate the value of any compound component by writing this value under the main connective of the component, and you should be sure to indicate the final value of each premise and the conclusion.)

Do not use attachment or detachment rules in **4**-**6**. That is, do not use Adj or the rules MTP, MPT, and Wk of §4.3; instead use only the basic rules for exploiting resources, planning for goals, and closing gaps.

4. $F \wedge \neg G \vDash \neg (G \wedge H)$

5. $\neg (J \wedge K), K \wedge L \vDash \neg J$

6. $\neg (B \wedge C) \vee A \vDash \neg C \vee A$

You ***may*** use attachment and detachment rules in **7**. While those rules can be used to shorten the derivation somewhat, it can also be completed without using them.

7. $R \vee \neg S \vDash \neg (S \wedge \neg R)$

F10 test 2 answers

1. Al presented his suggestion but didn't get both the management and the union to agree to it

Al presented his suggestion ∧ Al didn't get both the management and the union to agree to his suggestion

Al presented his suggestion ∧ ¬ Al got both the management and the union to agree to his suggestion

Al presented his suggestion ∧ ¬ (Al got the management to agree to his suggestion ∧ Al got the union to agree to his suggestion)

$$P \wedge \neg (M \wedge U)$$

both P and not both M and U

M: Al got the management to agree to his suggestion; P: Al presented his suggestion; U: Al got the union to agree to his suggestion

2. Either Bob didn't make the call or neither Carol nor Dave was home

Bob didn't make the call ∨ neither Carol nor Dave was home

¬ Bob made the call ∨ ¬ either Carol or Dave was home

¬ Bob made the call ∨ ¬ (Carol was home ∨ Dave was home)

$$\neg B \vee \neg (C \vee D)$$

either not B or not either C or D

B: Bob made the call; C: Carol was home; D: Dave was home

[¬ C ∧ ¬ D is also correct as an analysis of the second disjunct; and ¬ (B ∧ (C ∨ D)) is technically a correct analysis of the whole sentence, though it is much farther from the English.]

3. (E ∧ ¬ F) ∨ (¬ E ∧ F) (E: Dave contacted Ed; F: Dave contacted Fred)

(Dave contacted Ed ∧ ¬ Dave contacted Fred) ∨ (¬ Dave contacted Ed ∧ Dave contacted Fred)

(Dave contacted Ed ∧ Dave didn't contact Fred) ∨ (Dave didn't contact Ed ∧ Dave contacted Fred)

(Dave contacted Ed but not Fred) ∨ (Dave didn't contact Ed but did contact Fred)

Either Dave contacted Ed but not Fred, or he didn't contact Ed but did contact Fred

4.

	F ∧ ¬ G	3
	G ∧ H	2
2 Ext	G	(4)
2 Ext	H	
3 Ext	F	
3 Ext	¬ G	(4)
	●	
4 Nc	⊥	1
1 RAA	¬ (G ∧ H)	

5.

	¬ (J ∧ K)	3
	K ∧ L	2
	J	(5)
2 Ext	K	(6)
2 Ext	L	
	●	
5 QED	J	4
	●	
6 QED	K	4
4 Cnj	J ∧ K	3
3 CR	⊥	1
1 RAA	¬ J	

6.

	¬ (B ∧ C) ∨ A	2
	C	(7)
	¬ (B ∧ C)	4
	¬ A	
	¬ B	
	○	¬ B, ¬ A, C ⊭ ⊥
	⊥	6
6 IP	B	5
	●	
7 QED	C	5
5 Cnj	B ∧ C	4
4 CR	⊥	3
3 IP	A	2
	A	(8)
	●	
8 QED	A	2
2 PC	A	1
1 PE	¬ C ∨ A	

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

7. There are many possible answers; the following are three examples:

	$R \vee \neg S$	3
	$S \wedge \neg R$	2
2 Ext	S	(5)
2 Ext	$\neg R$	(4)
	R	(4)
	●	
4 Nc	$\perp$	3
	$\neg S$	(5)
	●	
5 Nc	$\perp$	3
3 PC	$\perp$	1
1 RAA	$\neg (S \wedge \neg R)$	

	$R \vee \neg S$	3
	$S \wedge \neg R$	2
2 Ext	S	(4)
2 Ext	$\neg R$	(3)
3 MTP	$\neg S$	(4)
	●	
4 Nc	$\perp$	1
1 RAA	$\neg (S \wedge \neg R)$	

	$R \vee \neg S$	1
	R	(2)
2 Wk	$\neg (S \wedge \neg R)$	X, (3)
	●	
3 QED	$\neg (S \wedge \neg R)$	1
	$\neg S$	(4)
4 Wk	$\neg (S \wedge \neg R)$	X, (5)
	●	
5 QED	$\neg (S \wedge \neg R)$	1
1 PC	$\neg (S \wedge \neg R)$	

Phi 270 F09 test 2

F09 test 2 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*. Be able to analyze the logical form of a sentence as fully as possible using conjunction, negation, and disjunction and present the form in both symbolic and English notation.
- *Synthesis*. Be able to synthesize an English sentence that has a given logical form.
- *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 a derivation where attachment rules (Adj and Wk) and detachment rules (MTP and MPT) may be used and where they will shorten the proof; but there will be other derivations where you must rely on the basic rules, either because detachment and attachment rules do not apply or because I tell you not to use them.

F09 test 2 questions

Analyze each sentence below in as much detail as possible, presenting the result in *both symbols and English notation*. Provide a key to your abbreviations of unanalyzed components, and be sure that they are complete and independent sentences. Try to respect any grouping in the English.

1. Either the demand was greater than expected or the backup unit wasn't ready.

2. Ann and Bill were not both notified, but neither needed a reminder.

Synthesize an English sentence (the more idiomatic the better) that has the following analysis:

3. $\neg S \wedge T$ (S: Sam heard the siren; T: Tom heard the siren)

Use derivations to check whether each of the claims of entailment below holds. If one fails, present a counterexample by providing a table in which you calculate the truth values of the premises and conclusion on an extensional interpretation (i.e., an assignment of truth values) that divides an open gap.

Do not use attachment or detachment rules in **4-6**. That is, do not use Adj or the rules MTP, MPT, and Wk of §4.3; instead use only the basic rules for exploiting resources, planning for goals, and closing gaps.

4. $\neg B \vDash \neg (A \wedge B)$

5. $\neg (A \wedge B) \vDash B$

6. $(A \wedge B) \vee (B \wedge C) \vDash B$

You ***may*** use attachment and detachment rules in **7**. They can be used to shorten the derivation somewhat; but, of course, it can also be completed without using them.

7. B, ¬ (B ∧ C) ⊨ ¬ C ∨ A

F09 test 2 answers

1. Either the demand was greater than expected or the backup unit wasn't ready

the demand was greater than expected ∨ the backup unit wasn't ready

the demand was greater than expected ∨ ¬ the backup unit was ready

G ∨ ¬ B

either G or not B

B: the backup unit was ready; G: the demand was greater than expected

2. Ann and Bill were not both notified, but neither needed a reminder

Ann and Bill were not both notified ∧ neither Ann nor Bill needed a reminder

¬ Ann and Bill were both notified ∧ ¬ either Ann or Bill needed a reminder

¬ (Ann was notified ∧ Bill was notified) ∧ ¬ (Ann needed a reminder ∨ Bill needed a reminder)

¬ (A ∧ B) ∧ ¬ (N ∨ L)

both not both A and B and not either N or L

A: Ann was notified; B: Bill was notified; L: Bill needed a reminder; N: Ann needed a reminder

[¬ A ∨ ¬ B is also correct for the first conjunct, and ¬ N ∧ ¬ L is correct for the second]

3. ¬ S ∧ T (S: Sam heard the siren; T: Tom heard the siren)

¬ Sam heard the siren ∧ Tom heard the siren

¬ Sam heard the siren ∧ Tom heard the siren

Sam didn't hear the siren ∧ Tom heard the siren

Sam didn't hear the siren, but Tom did

4.

	¬ B	(3)
	A ∧ B	2
2 Ext	A	
2 Ext	B	(3)
	●	
3 Nc	⊥	1
1 RAA	¬ (A ∧ B)	

5.

	¬ (A ∧ B)	2
	¬ B	
	¬ A	
	○	¬ A, ¬ B ⊭ ⊥
	⊥	4
4 IP	A	3
	¬ B	
	○	¬ B ⊭ ⊥
	⊥	5
5 IP	B	3
3 Cnj	A ∧ B	2
2 CR	⊥	1
1 IP	B	

The first interpretation divides both gaps; the second is another way of dividing the second gap.

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

6.

	(A ∧ B) ∨ (B ∧ C)	1
	A ∧ B	2
2 Ext	A	
2 Ext	B	(3)
	●	
3 QED	B	1
	B ∧ C	4
4 Ext	B	(5)
4 Ext	C	
	●	
5 QED	B	1
1 PC	B	

7. There are many possible answers; the following are only two samples:

	B	(1)
	¬ (B ∧ C)	1
1 MPT	¬ C	(2)
2 Wk	¬ C ∨ A	X, (3)
	●	
3 QED	¬ C ∨ A	

	B	(5)
	¬ (B ∧ C)	3
	C	(6)
	¬ A	
	●	
5 QED	B	4
	●	
6 QED	C	4
4 Cnj	B ∧ C	3
3 CR	⊥	2
2 IP	A	1
1 PE	¬ C ∨ A	

Phi 270 F08 test 2

F08 test 2 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*. Be able to analyze the logical form of a sentence as fully as possible using conjunction, negation, and disjunction and present the form in both symbolic and English notation.
- *Synthesis*. Be able to synthesize an English sentence that has a given logical form.
- *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 a derivation where detachment and attachment rules may be used and where they will shorten the proof; but there will be other derivations where you must rely on the basic rules, either because detachment and attachment rules do not apply or because I tell you not to use them.

  I might also ask you to answer a question about derivations, either one you have given or derivations in general. For example, you might be asked about a particular point in a derivation to list the active resources and goal or to indicate all the basic rules that could be applied. I might also ask, though this is less likely, that you explain why a given derivation rule is legitimate. (You've seen questions of the first sort in your homework; for an example of the second sort, see question 8 of test 1 for 2000.)

F08 test 2 questions

Analyze each sentence below in as much detail as possible, presenting the result in *both symbols and English notation* (i.e., using ∧, etc. and also both ... and, etc.). Be sure that the unanalyzed components of your answer are complete and independent sentences, and try to respect any grouping in the English.

1. Neither Ann nor Bill got the joke, but Carol did.

2. Either Ann didn't reach Bill, or he wasn't both free and able to help her.

Synthesize an English sentence (the more idiomatic the better) that has the following analysis:

3. ¬ (B ∨ M) (B: Sam had heard of the book; M: Sam had heard of the movie)

Use derivations to check whether each of the entailments below holds. If one fails, present a counterexample by providing a table in which you calculate the truth values of the premises and conclusion on an extensional interpretation (i.e., an assignment of truth values) that divides an open gap.

Do not use attachment or detachment rules in **4**-**6**. That is, do not use Adj or the rules MTP, MPT, and Wk of §4.3; instead use only the basic rules for exploiting resources, planning for goals, and closing gaps.

4. A ∧ ¬ B ⊨ ¬ (C ∧ B) ∧ A

5. ¬ (A ∧ B), A ⊨ ¬ B

6. B ∨ A ⊨ C ∨ B

For **7** you should show the ***first stage of each*** of the possible ways of beginning the derivation with the basic rules (i.e., the rules allowed in **4**-**6**); and you should ***complete one*** of these derivations. In completing it, you ***may*** use attachment and detachment rules (and their use can simplify the derivation).

7. B ∨ A ⊨ A ∨ B

F08 test 2 answers

1. Neither Ann nor Bill got the joke, but Carol did

Neither Ann nor Bill got the joke ∧ Carol got the joke

¬ either Ann or Bill got the joke ∧ Carol got the joke

¬ (Ann got the joke ∨Bill got the joke) ∧ Carol got the joke

$$\neg (A \vee B) \wedge C$$

both not either A or B and C

A: Ann got the joke; B: Bill got the joke; C: Carol got the joke

[(¬ A ∧ ¬ B) ∧ C is also correct]

2. Either Ann didn't reach Bill, or he wasn't both free and able to help her

Ann didn't reach Bill ∨ Bill wasn't both free and able to help Ann

¬ Ann reached Bill ∨ ¬ Bill was both free and able to help Ann

¬ Ann reached Bill ∨ ¬ (Bill was free ∧ Bill was able to help Ann)

$$\neg R \vee \neg (F \wedge A)$$

either not R or not both F and A

A: Bill was able to help Ann; F: Bill was free; R: Ann reached Bill

3. ¬ (B ∨ M) (B: Sam had heard of the book; M: Sam had heard of the movie)

¬ (Sam had heard of the book ∨ Sam had heard of the movie)

¬ Sam had heard of either the book or the movie

Sam had heard of neither the book nor the movie

or

Sam hadn't heard of either the book or the movie

4.

	A ∧ ¬ B	1
1 Ext	A	(6)
1 Ext	¬ B	(5)
	C ∧ B	4
4 Ext	C	
4 Ext	B	(5)
	●	
5 Nc	⊥	3
3 RAA	¬ (C ∧ B)	2
	●	
6 QED	A	2
2 Cnj	¬ (C ∧ B) ∧ A	

5.

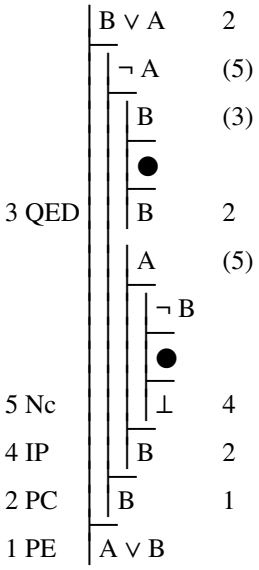
	¬ (A ∧ B)	2
	A	(4)
	B	(5)
	●	
4 QED	A	3
	●	
5 QED	B	3
3 Cnj	A ∧ B	2
2 CR	⊥	1
1 RAA	¬ B	

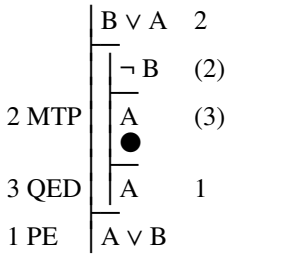
6.

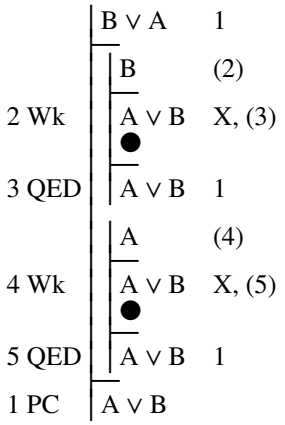
	B ∨ A	2
	¬ C	
	B	(3)
	●	
3 QED	B	2
	A	
	¬ B	
	○	A, ¬ B, ¬ C ⊭ ⊥
	⊥	4
4 IP	B	2
2 PC	B	1
1 PE	C ∨ B	

A	B	C	B ∨ A	C ∨ B
T	F	F	Ⓣ	Ⓕ

7. The first stages of the three derivations below show the possible ways of beginning, and the full derivations illustrate some of the ways the derivation could be completed. (You were required to complete only one derivation.)







Phi 270 F06 test 2

F06 test 2 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*. Be able to analyze the logical form of a sentence as fully as possible using conjunction and present the form in both symbolic and English notation.
- *Synthesis*. Be able to synthesize an English sentence that has a given logical form.
- *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 at least one derivation where detachment and attachment rules may be used and where they will shorten the proof. But there will be other derivations 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.

  I may also ask you to explain why a derivation rule works or does not work. This may be one of the rules you have available for use or another conceivable rule that is not part of the system we use. (For an example of a question of this sort, see question 8 of test 1 for 2000.)

F06 test 2 questions

Analyze each sentence below in as much detail as possible, presenting the result in *both symbols and English notation* (using both … and …, etc., as well as ∧, etc.). Be sure that the unanalyzed components of your answer are complete and independent sentences; also try to respect any grouping in the English.

1. Sam was cool, but he was not both calm and collected.

2. Tom spoke to either Al or Barb but to neither Carol nor Dave.

Synthesize an English sentence (the more idiomatic the better) that has the following analysis:

3. ¬ E ∨ F (E: Ed worked last weekend; F: Fred worked last weekend)

Use derivations to check whether each of the entailments below holds. If one fails, present a counterexample by providing a table in which you calculate the truth values of the premises and conclusion on an extensional interpretation (i.e., an assignment of truth values) that divides an open gap.

Do not use attachment or detachment rules in **4-6**. That is, do not use Adj or the rules MTP, MPT, and Wk of §4.3; instead use only the basic rules for exploiting resources, planning for goals, and closing gaps.

4. A ∧ B ⊨ ¬ (C ∧ ¬ B)

5. $\neg (A \wedge B), \neg A \vDash B$

6. $C, A \vee B \vDash A \vee (B \wedge C)$

In **7** you ***may*** use attachment and detachment rules (and their use can simplify the derivation).

7. $\neg (A \wedge C), A \vee B \vDash B \vee \neg C$

F06 test 2 answers

1. Sam was cool, but he was not both calm and collected

Sam was cool ∧ Sam was not both calm and collected

Sam was cool ∧ ¬ Sam was both calm and collected

Sam was cool ∧ ¬ (Sam was calm ∧ Sam was collected)

$$L \wedge \neg (M \wedge T)$$

both L and not both M and T

L: Sam was cool; M: Sam was calm; T: Sam was collected

2. Tom spoke to either Al or Barb but to neither Carol nor Dave

Tom spoke to either Al or Barb ∧ Tom spoke to neither Carol nor Dave

(Tom spoke to Al ∨ Tom spoke to Barb) ∧ ¬ Tom spoke to either Carol or Dave

(Tom spoke to Al ∨ Tom spoke to Barb) ∧ ¬ (Tom spoke to Carol ∨ Tom spoke to Dave)

$$(A \vee B) \wedge \neg (C \vee D)$$

both either A or B and not either C or D

A: Tom spoke to Al; B: Tom spoke to Barb; C: Tom spoke to Carol; D: Tom spoke to Dave

3. ¬ E ∨ F (E: Ed worked last weekend; F: Fred worked last weekend)

¬ Ed worked last weekend ∨ Fred worked last weekend

Ed didn't work last weekend ∨ Fred worked last weekend

Either Ed didn't work last weekend or Fred did

4.

	$A \wedge B$	1
1 Ext	A	
1 Ext	B	(4)
	$C \wedge \neg B$	3
3 Ext	C	
3 Ext	$\neg B$	(4)
	●	
4 Nc	$\perp$	2
2 RAA	$\neg (C \wedge \neg B)$	

5.

	¬ (A ∧ B)	2
	¬ A	1
	¬ B	3
	¬ A	
	○	¬ A, ¬ B ⊭ ⊥
	⊥	4
4 IP	A	3
	¬ B	
	○	¬ A, ¬ B ⊭ ⊥
	⊥	
5 IP	B	3
3 Cnj	A ∧ B	2
2 CR	⊥	1
1 IP	B	

A	B	¬ (A ∧ B), ¬ A / B			
F	F	Ⓣ	F	Ⓣ	Ⓕ

6.

	C	(3)
	A ∨ B	4
	¬ A	(7)
	A	(7)
	¬ B	
	●	
7 Nc	⊥	6
6 IP	B	4
	B	(5)
	●	
5 QED	B	4
4 PC	B	2
	●	
3 QED	C	2
2 Cnj	B ∧ C	1
1 PE	A ∨ (B ∧ C)	

7.

	¬ (A ∧ C)	2
	A ∨ B	3
	C	(2)
2 MPT	¬ A	(3)
3 MTP	B	(4)
	●	
4 QED	B	1
1 PE	B ∨ ¬ C	

Phi 270 F05 test 2

F05 test 2 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.

- *Definitions of basic concepts.* Be able to state (in terms of possible worlds and truth values) the conditions under which sentences are mutually exclusive, jointly exhaustive, or contradictory and also the conditions under which the relation of relative exhuastiveness holds between sets.
- *Analysis.* Be able to analyze the logical form of a sentence as fully as possible using negation and disjunction in addition to conjunction and present the form in both symbolic and English notation (that is, with the logical and symbol and by expressing forms using both ... and …, etc.).
- *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 at least one derivation where detachment and attachment rules may be used and where they will shorten the proof. But there will be other derivations 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.

F05 test 2 questions

Complete the following to give a definition in terms of truth values and possible worlds.

1. φ and ψ are mutually exclusive (i.e., φ, ψ ⊨ ⊥) if and only if …

Analyze each sentence below in as much detail as possible, presenting the result using both in symbols and using English notation (i.e., both … and, etc.). Be sure that the unanalyzed components of your answer are complete and independent sentences; also try to respect any grouping in the English.

2. The job didn't have both good pay and flexible hours, and Sam didn't apply for it.

3. Although neither Luke nor Mary saw the movie, either Nancy or Oscar did.

Use derivations to check whether each of the entailments below holds. If one fails, present a counterexample by providing a table in which you calculate the truth values of the premises and conclusion on an extensional interpretation (i.e., an assignment of truth values) that divides an open gap.

Do not use attachment or detachment rules in **4-6**. That is, do not use Adj or the rules MTP, MPT, and Wk of §4.3; instead use only the basic rules for exploiting resources, planning for goals, and closing gaps.

4. ¬ B ⊨ ¬ (A ∧ (B ∧ C))

5. ¬ (A ∧ B) ⊨ ¬ A

6. (A ∧ B) ∨ C ⊨ C ∨ B

In **7** you ***may*** use attachment and detachment rules (and their use can simplify the derivation).

7. A ∨ B, ¬ (B ∧ C), C ⊨ A

F05 test 2 answers

1. φ and ψ are mutually exclusive if and only if there is no possible world in which both are true (or: … if and only if, in every possible world, at least one is false)

2. The job didn't have both good pay and flexible hours, and Sam didn't apply for it

The job didn't have both good pay and flexible hours ∧ Sam didn't apply for the job

¬ the job had both good pay and flexible hours ∧ ¬ Sam applied for the job

¬ (the job had good pay ∧ the job had flexible hours) ∧ ¬ Sam applied for the job

$$\neg (G \wedge F) \wedge \neg A$$

both not both G and F and not A

A: Sam applied for the job; F: the job had flexible hours; G: the job had good pay

(¬ G ∧ ¬ F) ∧ ¬ A would say that the job had neither good pay nor flexible hours, so it is not equivalent to ¬ (G ∧ F) ∧ ¬ A and it's not correct; (¬ G ∨ ¬ F) ∧ ¬ A would be equivalent, but it is pretty far from the form of the English.

3. Although neither Luke nor Mary saw the movie, either Nancy or Oscar did.

neither Luke nor Mary saw the movie ∧ either Nancy or Oscar saw the movie

¬ either Luke or Mary saw the movie ∧ (Nancy saw the movie ∨ Oscar saw the movie)

¬ (Luke saw the movie ∨ Mary saw the movie) ∧ (Nancy saw the movie ∨ Oscar saw the movie)

$$\neg (L \vee M) \wedge (N \vee O)$$

both not either L or M and either N or O

L: Luke saw the movie; M: Mary saw the movie; N: Nancy saw the movie; O: Oscar saw the movie

(¬ L ∧ ¬ M) ∧ (N ∨ O) is equivalent to the answer above and is also correct.

4.

	¬ B	(4)
	A ∧ (B ∧ C)	2
2 Ext	A	
2 Ext	B ∧ C	3
3 Ext	B	(4)
3 Ext	C	
	●	
4 Nc	⊥	1
1 RAA	¬ (A ∧ (B ∧ C))	

5.

	¬ (A ∧ B)	2	
	A	(4)	
	●		
4 QED	A	3	
	¬ B		
	○	A, ¬ B ⊭ ⊥	
	⊥	5	
5 IP	B	3	
3 Cnj	A ∧ B	2	
2 CR	⊥	1	
1 RAA	¬ A		

A	B	¬ (A ∧ B) / ¬ A		
T	F	Ⓣ	F	Ⓕ

6.

	(A ∧ B) ∨ C	1
	A ∧ B	2
2 Ext	A	
2 Ext	B	(4)
	¬ C	
	●	
4 QED	B	3
3 PE	C ∨ B	1
	C	(6)
	¬ B	
	●	
6 QED	C	5
5 PE	C ∨ B	1
1 PC	C ∨ B	

It is also possible to begin with PE; if that's done, IP and Nc will be needed to close one of the gaps.

7. The first answer below uses detachment rules while the second shows one way to construct a derivation without them.

	A ∨ B	2	
	¬ (B ∧ C)	1	
	C	(1)	
1 MPT	¬ B	(2)	
2 MTP	A	(3)	
	●		
3 QED	A		

A ∨ B	1	
¬ (B ∧ C)	4	
C	(7)	
A	(2)	
●		
A	1	2 QED
B	(6)	
¬ A		
●		
B	5	6 QED
●		
C	5	7 QED
B ∧ C	4	5 Cnj
⊥	3	4 CR
A	1	3 IP
A		1 PC

Phi 270 F04 test 2

F04 test 2 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.* Be able to analyze the logical form of a sentence as fully as possible using negation and disjunction in addition to conjunction and present the form in both symbolic and English notation (that is, with the logical and symbol and by expressing forms using both … and …, etc.).
- *Synthesis.* You may be given a symbolic form and an interpretation of its non-logical vocabulary and asked to express the sentence in English.
- *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 at least one derivation where detachment and attachment rules may be used and where they will shorten the proof. But there will be other derivations 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.

  I may also ask you to explain why a derivation rule is safe or sound with reference to the extensional interpretations (i.e., assignments of truth values) that divide gaps before and after the rule is applied.

F04 test 2 questions

Analyze each sentence below in as much detail as possible, presenting the result using both in symbols and using English notation (i.e., both … and, etc.). 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 found his wallet but not his keys
2. Mike didn't notice the problem, but either Nina or Oscar did
3. Neither the house nor the apartment was both cheap and roomy

Use derivations to check whether each of the entailments below holds. If one fails, present a counterexample by providing a table in which you calculate the truth values of the premises and conclusion on an extensional interpretation (i.e., an assignment of truth values) that divides an open gap.

Do not use attachment or detachment rules in **4-6**. That is, do not use Adj or the rules MTP, MPT, and Wk of 4.3; instead use only the basic rules for exploiting resources, planning for goals, and closing gaps.

4. A ∧ ¬ C ⊨ ¬ (B ∧ C)
5. ¬ (B ∧ C), A ∧ B ⊨ A ∧ ¬ C
6. A ∨ B ⊨ A ∨ C

In **7** you ***may*** use attachment and detachment rules (and their use can simplify the derivation).

7. $\neg (A \wedge B), A \vee \neg C \vDash \neg (B \wedge C)$

F04 test 2 answers

1. Dan found his wallet but not his keys

Dan found his wallet ∧ Dan didn't find his keys

Dan found his wallet ∧ ¬ Dan found his keys

$$W \wedge \neg K$$

both W and not K

K: Dan found his keys; W: Dan found his wallet

2. Mike didn't notice the problem, but either Nina or Oscar did

Mike didn't notice the problem ∧ either Nina or Oscar noticed the problem

¬ Mike noticed the problem ∧ (Nina noticed the problem ∨ Oscar noticed the problem)

$$\neg M \wedge (N \vee O)$$

both not M and either N or O

M: Mike noticed the problem; N: Nina noticed the problem; O: Oscar noticed the problem

3. Neither the house nor the apartment was both cheap and roomy

¬ either the house or the apartment was both cheap and roomy

¬ (the house was both cheap and roomy ∨ the apartment was both cheap and roomy)

¬ ((the house was cheap ∧ the house was roomy) ∨ (the apartment was cheap ∧ the apartment was roomy))

$$\neg ((C \wedge R) \vee (H \wedge M))$$

not either both C and R or both H and M

C: the house was cheap; H: the apartment was cheap; R: the house was roomy; M: the apartment was roomy

¬ (C ∧ R) ∧ ¬ (H ∧ M) and (¬ C ∨ ¬ R) ∧ (¬ H ∨ ¬ M) are also equivalent (though further from the English); however, (¬ C ∧ ¬ R) ∧ (¬ H ∧ ¬ M) is not equivalent to these sentences. The latter is equivalent to ¬ (C ∨ R) ∧ ¬ (H ∨ M) and ¬ ((C ∨ R) ∨ (H ∨ M)), and those sentences say: neither the house nor the apartment was either cheap or roomy.

4.

	$A \wedge \neg C$	1
1 Ext	A	
1 Ext	$\neg C$	(4)
	$B \wedge C$	3
3 Ext	B	
3 Ext	C	(4)
	●	
4 Nc	$\perp$	2
2 RAA	$\neg (B \wedge C)$	

5.

	$\neg (B \wedge C)$	5
	$A \wedge B$	1
1 Ext	A	(3)
1 Ext	B	(7)
	●	
3 QED	A	2
	C	(8)
	●	
7 QED	B	6
	●	
8 QED	C	6
6 Cnj	$B \wedge C$	5
5 CR	$\perp$	4
4 RAA	$\neg C$	2
2 Cnj	$A \wedge \neg C$	

6.

	$A \vee B$	2
	$\neg C$	
	A	(3)
	●	
3 QED	A	2
	B	
	$\neg A$	
	○	$\neg A, B, \neg C \not\models \perp$
	$\perp$	4
4 IP	A	2
2 PC	A	1
1 PE	$A \vee C$	

A	B	C	$A \vee B$ /	$A \vee C$
F	T	F	Ⓣ	Ⓕ

7. The first answer below uses detachment rules while the second shows how to construct a derivation in this case without them.

	$\neg (A \wedge B)$	3
	$A \vee \neg C$	4
	$B \wedge C$	2
2 Ext	B	(3)
2 Ext	C	(5)
3 MPT	$\neg A$	(4)
4 MTP	$\neg C$	(5)
	●	
5 Nc	$\perp$	1
1 RAA	$\neg (B \wedge C)$	

	$\neg (A \wedge B)$	3
	$A \vee \neg C$	6
	$B \wedge C$	2
2 Ext	B	(5)
2 Ext	C	(9)
	A	(7)
	●	
7 QED	A	6
	$\neg C$	(9)
	$\neg A$	
	●	
9 Nc	$\perp$	8
8 IP	A	6
6 PC	A	4
	●	
5 QED	B	4
4 Cnj	$A \wedge B$	3
3 CR	$\perp$	1
1 RAA	$\neg (B \wedge C)$	

Phi 270 F03 test 2

F03 test 2 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.

- *Basic concepts of deductive logic.* In addition to the concepts that were topics for the first test--entailment (or validity), equivalence, tautologousness, absurdity, and inconsistency--you will be responsible for the concepts of a mutually exclusive, jointly exhaustive, or contradictory pair of sentences. You should be able to define each in terms of possible worlds and truth values, and you should be prepared to answer questions about them, justifying your answer by reference to the definitions.
- *Analysis.* Be able to analyze the logical form of a sentence as fully as possible using negation and disjunction in addition to conjunction and present the form in both symbolic and English notation (that is, with the logical-and symbol ∧ and with the way of expressing forms using both … and …, etc.).
- *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.

  I may also ask you to explain why a derivation rule is safe or sound by comparing the extensional interpretations (i.e., assignments of truth values) that divide gaps before and after the rule is applied.

F03 test 2 questions

1. Define contradictoriness by completing the following:

φ and ψ are contradictory if and only if …

(Your answer should define contradictoriness in terms of truth values and possible worlds.)

Analyze each sentence below in as much detail as possible, presenting the result using both symbolic and English notation for the connectives. Besure that the unanalyzed components of your answer are complete and independent sentences; also try to respect any grouping in the English.

2. Ann found the note but didn't recognize the signature

3. Either the manufacturer and the distributor weren't both available or neither of them changed its offer

Use derivations to check whether each of the entailments below holds. If one fails, present a counterexample by providing a table in which you calculate the truth values of the premises and conclusion on an extensional interpretation (i.e., an assignment of truth values) which divides an open gap.

Do not use attachment or detachment rules in **4** and **5**. That is, do not use Adj or the new rules of 4.3; instead use only the basic rules for exploiting resources, planning for goals, and closing gaps.

4. $\neg B \vDash \neg (A \wedge B)$

5. $\neg (\neg A \wedge \neg B), C \wedge \neg B \vDash A$

In **6** and **7** you **may** use attachment and detachment rules if you have an opportunity to do so.

6. $A \vee B \vDash C \vee D$

7. $\neg (A \wedge C), A \vee B, \neg (B \wedge \neg D) \vDash \neg (C \wedge \neg D)$

F03 test 2 answers

1. φ and ψ are contradictory if and only if there is no possible world where they have the same truth value.

2. Ann found the note but didn't recognize the signature

Ann found the note ∧ Ann didn't recognize the signature

Ann found the note ∧ ¬ Ann recognized the signature

$$F \wedge \neg R$$

both F and not R

F: Ann found the note; R: Ann recognized the signature

3. Either the manufacturer and the distributor weren't both available or neither of them changed its offer

the manufacturer and the distributor weren't both available ∨ neither themanufacturer nor the distributor changed its offer

¬ the manufacturer and the distributor were both available ∨ ¬ either the manufacturer or the distributor changed its offer

¬ (the manufacturer was available ∧ the distributor was available) ∨ ¬ (the manufacturer changed its offer ∨ the distributor changed its offer)

$$\neg (A \wedge V) \vee \neg (C \vee H)$$

either not both A and V or not either C or H

A: the manufacturer was available; C: the manufacturer changed its offer; H: the distributor changed its offer; V: the distributor was available

4.

	¬ B	(3)
	A ∧ B	2
2 Ext	A	
2 Ext	B	(3)
	●	
3 Nc	⊥	1
1 RAA	¬ (A ∧ B)	

5.

	¬ (¬ A ∧ ¬ B)	3
	C ∧ ¬ B	1
1 Ext	C	
1 Ext	¬ B	(6)
	¬ A	(5)
	●	
5 QED	¬ A	4
	●	
6 QED	¬ B	4
4 Cnj	¬ A ∧ ¬ B	3
3 CR	⊥	2
2 IP	A	

6.

	A ∨ B	2	
	¬ C		
	A		
	¬ D		
	○		A, ¬ C, ¬ D ⊭ ⊥
	⊥	3	
3 IP	D	2	
	B		
	¬ D		
	○		B, ¬ C, ¬ D ⊭ ⊥
	⊥	4	
4 IP	D	2	
2 PC	D	1	
1 PE	C ∨ D		

A	B	C	D	A ∨ B	/	C ∨ D	
T	F	F	F	Ⓣ		Ⓕ	divides 1st open gap
T	T	F	F	Ⓣ		Ⓕ	divides both open gaps
F	T	F	F	Ⓣ		Ⓕ	divides 2nd open gap

7.

	¬ (A ∧ C)	3
	A ∨ B	4
	¬ (B ∧ ¬ D)	5
	C ∧ ¬ D	2
2 Ext	C	(3)
2 Ext	¬ D	(6)
3 MPT	¬ A	(4)
4 MTP	B	(5)
5 MPT	D	(6)
	●	
6 Nc	⊥	1
1 RAA	¬ (C ∧ ¬ D)	

Phi 270 F02 test 2

F02 test 2 questions

1. Define inconsistency by completing the following:

Γ is inconsistent (i.e., Γ ⊨ ⊥) if and only if … .

(Your answer need not replicate the wording of the text's definitions, but it should define equivalence in terms of truth values and possible worlds.)

Analyze each sentence below in as much detail as possible, presenting 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.

2. Al needed both the book and the disk but Bob didn't.

3. The car wasn't there or neither Al nor Barb saw it.

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.

4. A ∧ ¬ B ⊨ ¬ (A ∧ ¬ C)

5. (A ∧ B) ∨ C, ¬ (C ∧ ¬ B) ⊨ B

6. B ∨ (A ∨ C) ⊨ A ∨ B

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

F02 test 2 answers

1. $\Gamma \models \bot$ if and only if there is no possible world in which all members of Γ are true.

2. Al needed both the book and the disk ∧ Bob didn't need both the book and the disk

(Al needed the book ∧ Al needed the disk) ∧ ¬ Bob needed both the book and the disk

(Al needed the book ∧ Al needed the disk) ∧ ¬ (Bob needed the book ∧ Bob needed the disk)

$$(B \wedge D) \wedge \neg (O \wedge S)$$

both both B and D and not both O and S

B: Al needed the book; D: Al needed the disk; O: Bob needed the book; S: Bob needed the disk

3. The car wasn't there ∨ neither Al nor Barb saw the car

¬ the car was there ∨ ¬ either Al or Barb saw the car

¬ the car was there ∨ ¬ (Al saw the car ∨ Barb saw the car)

$$\neg C \vee \neg (A \vee B)$$

either not C or not either A or B

A: Al saw the car; B: Barb saw the car; C: the car was there

4.

	A ∧ ¬ B	1
1 Ext	A	
1 Ext	¬ B	
	A ∧ ¬ C	3
3 Ext	A	
3 Ext	¬ C	
	○	A, ¬ B, ¬ C ⊭ ⊥
	⊥	2
2 RAA	¬ (A ∧ ¬ C)	

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

5.

	(A ∧ B) ∨ C	1
	¬ (C ∧ ¬ B)	5
	A ∧ B	2
2 Ext	A	
2 Ext	B	(3)
	●	
3 QED	B	1
	C	(6)
	¬ B	(6)
6 Adj	C ∧ ¬ B	X,(7)
	●	
7 QED	C ∧ ¬ B	5
5 CR	⊥	4
4 IP	B	1
1 PC	B	

6.

	B ∨ (A ∨ C)	2
	¬ A	(6)
	B	(3)
	●	
3 QED	B	2
	A ∨ C	4
	A	(6)
	¬ B	
	●	
6 Nc	⊥	5
5 IP	B	4
	C	
	¬ B	
	○	¬ A, ¬ B, C ⊭ ⊥
	⊥	7
7 IP	B	4
4 PC	B	2
2 PC	B	1
1 PE	A ∨ B	

A	B	C	B	∨	(A	∨	C)	/	A	∨	B
F	F	T		Ⓣ		T			Ⓕ		

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

Phi 270 F00 test 2

F00 test 2 questions

1. Define (logical) conditional inconsistency by completing the following: φ is inconsistent with Γ (i.e., Γ, φ ⊨) if and only if … . (Your answer need not replicate the wording of the text's definitions, but it should define equivalence in terms of truth values and possible worlds.)

Analyze the sentences below in as much detail as possible, presenting 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.

2. Sam didn't eat his cake and keep it, too, but he wasn't disappointed.

3. Either the intruder woke neither the cat nor the dog or it was someone they both knew.

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.

4. C ∧ D ⊨ ¬ (B ∧ ¬ C)

5. (A ∧ C) ∨ (B ∧ D) ⊨ B ∨ C

6. ¬ (A ∨ B), A ∨ D, ¬ (C ∧ D) ⊨ C

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

F00 test 2 answers

1. Γ, φ ⊨ if and only if there is no possible world in which φ is true along with and all members of Γ.

2. Sam didn't eat his cake and keep it ∧ Sam wasn't disappointed

¬ Sam ate his cake and kept it ∧ Sam wasn't disappointed

¬ (Sam ate his cake ∧ Sam kept his cake) ∧ ¬ Sam was disappointed

¬ (A ∧ K) ∧ ¬ D

both not both J and S and not D

A: Sam ate his cake; D: Sam was disappointed; K: Sam kept his cake

3. the intruder woke neither the cat nor the dog ∨ the intruder was someone the cat and the dog both knew

¬ the intruder woke either the cat or the dog ∨ (the intruder was someone the cat knew ∧ the intruder was someone the dog knew)

¬ (the intruder woke the cat ∨ the intruder woke the dog ∨ (the intruder was someone the cat knew ∧ the intruder was someone the dog knew)

¬ (C ∨ D) ∨ (K ∧ N)

either not either C or D or both K and N

C: the intruder woke the cat; D:the intruder woke the dog; K: the intruder was someone the cat knew; N: the intruder was someone the dog knew

4.

	C ∧ D	2
	B ∧ ¬ C	3
2 Ext	C	(4)
2 Ext	D	
3 Ext	B	
3 Ext	¬ C	(4)
	●	
4 Nc	⊥	1
1 RAA	¬ (B ∧ ¬ C)	

5.

	(A ∧ C) ∨ (B ∧ D)	1
	A ∧ C	2
2 Ext	A	
2 Ext	C	(4)
	¬ B	
	●	
4 QED	C	3
3 PE	B ∨ C	1
	B ∧ D	5
5 Ext	B	(7)
5 Ext	D	
	¬ C	
	●	
7 QED	B	6
6 PE	B ∨ C	1
1 PC	B ∨ C	

6. This answer illustrates the use of detachment rules; other, longer, derivations are possible without them. IP is used at the first stage in order to make it possible to exploit the first premise by CR, the only rule available for exploiting negated disjunctions.

	¬ (A ∨ B)	2
	A ∨ D	4
	¬ (C ∧ D)	5
	¬ C	
	¬ A	(4)
4 MTP	D	(5)
5 MPT	¬ C	
	¬ B	
	○	¬A, ¬B, ¬C, D ⊭ ⊥
	⊥	6
6 IP	B	3
3 PE	A ∨ B	2
2 CR	⊥	1
1 IP	C	

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

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

Phi 270 F99 test 2

F99 test 2 questions

Analyze the sentence below in as much detail as possible, presenting 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. Fred crossed the desert without having both a jack and a spare tire.

2. Bob either found someone to go or went himself, but neither Carol nor her luggage was there.

Use derivations to check whether each of the entailments below holds. You may use detachment and attachment rules. If an entailment fails, provide a table in which you calculate the truth values of the premises and conclusion on an extensional interpretation (i.e., an assignment of truth values) that divides an open gap.

3. A ∧ ¬ B ⊨ ¬ (B ∧ ¬ C)

4. ¬ (¬ A ∧ B) ⊨ C

5. (A ∧ B) ∨ C, ¬ (A ∧ D) ⊨ C ∨ ¬ D

6. B ∨ (C ∧ D) ⊨ A ∨ (B ∨ C)

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

F99 test 2 answers

1. Fred crossed the desert without having both a jack and a spare tire

Fred crossed the desert ∧ ¬ Fred had both a jack and a spare tire

Fred crossed the desert ∧ ¬ (Fred had a jack ∧ Fred had a spare tire)

$$D \wedge \neg (J \wedge S)$$

both D and not both J and S

D: Fred crossed the desert; J: Fred had a jack; S: Fred had a spare tire

2. Bob either found someone to go or went himself, but neither Carol nor her luggage was there

Bob either found someone to go or went himself ∧ neither Carol nor her luggage was there

(Bob found someone to go ∨ Bob went himself) ∧ ¬ either Carol or her luggage was there

(Bob found someone to go ∨ Bob went himself) ∧ ¬ (Carol was there ∨ Carol's luggage was there)

$$(F \vee W) \wedge \neg (C \vee L)$$

both either F or W and not either C or L

F: Bob found someone to go; W:Bob went himself; C: Carol was there; L: Carol's luggage was there

3.

	A ∧ ¬ B	1
1 Ext	A	
1 Ext	¬ B	(4)
	B ∧ ¬ C	3
3 Ext	B	(4)
3 Ext	¬ C	
	●	
4 Nc	⊥	2
2 RAA	¬ (B ∧ ¬ C)	

4.

	¬ (¬ A ∧ B)	2
	¬ C	
	A	
	○	A, ¬C ⊭ ⊥
	⊥	4
4 RAA	¬ A	3
	¬ B	
	○	¬B, ¬C ⊭ ⊥
	⊥	5
5 IP	B	3
3 Cnj	¬ A ∧ B	2
2 CR	⊥	1
1 IP	C	

A B C	¬ (¬ A ∧ B) / C	
T T F	Ⓣ F F	Ⓕ divides 1st gap
T F F	Ⓣ F F	Ⓕ divides both gaps
F F F	Ⓣ T F	Ⓕ divides 2nd gap

5.

	(A ∧ B) ∨ C	3
	¬ (A ∧ D)	5
	¬ C	
	D	(6)
	A ∧ B	4
4 Ext	A	(6)
4 Ext	B	
6 Adj	A ∧ D	X,(7)
	●	
7 QED	A ∧ D	5
5 CR	⊥	3
	C	
	⊥	3
3 PC	⊥	2
2 RAA	¬ D	1
1 PE	C ∨ ¬ D	

OR

	(A ∧ B) ∨ C	2
	¬ (A ∧ D)	4
	¬ C	(2)
2 MTP	A ∧ B	3
3 Ext	A	(4)
3 Ext	B	
4 MPT	¬ D	(5)
	●	
5 QED	¬ D	1
1 PE	C ∨ ¬ D	

6.

	B ∨ (C ∧ D)	2		B ∨ (C ∧ D)	3
	¬ A			¬ A	
	B	(4)		¬ B	(3)
	¬ C		3 MTP	C ∧ D	4
	●		4 Ext	C	(5)
4 QED	B	3	4 Ext	D	
3 PE	B ∨ C	2		●	
	C ∧ D	5	5 QED	C	2
5 Ext	C	(7)	2 PE	B ∨ C	1
5 Ext	D		1 PE	A ∨ (B ∨ C)	
	¬ B				
	●				
7 QED	C	6			
6 PE	B ∨ C	2			
2 PC	B ∨ C	1			
1 PE	A ∨ (B ∨ C)				

OR

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

Phi 270 F98 test 2

F98 test 2 questions

1. Analyze the sentence below in as much detail as possible and express the result in both symbolic and English notation. Be sure that the unanalyzed components of your answer are complete and independent sentences and try to respect any grouping in the original sentence.

Bob didn't have both fuel and either a match or a lighter

2. Synthesize an idiomatic English sentence expressing the proposition which is assigned to the symbolic form below by the intensional interpretation to its right—i.e., give an English sentence whose analysis would be the following:

$$\neg ((A \wedge B) \vee (N \wedge L))$$

A: Carol saw Ann; B: Carol saw Bill; N: Dave saw Ann; L: Dave saw Bill

Use derivations to check each of the following claims of entailment. You may use the detachment rule MPT but not MTP; although the use of MPT is not necessary, it can shorten a couple of the derivations. If a derivation fails, present a counterexample that divides an open gap.

3. $B \vDash \neg (A \wedge \neg B)$

4. $\neg (A \wedge B) \vDash \neg (C \wedge \neg B)$

5. $\neg (A \wedge \neg (B \wedge C)) \vDash \neg (A \wedge \neg C)$

6. $A \vee (B \wedge C) \vDash C \vee A$

F98 test 2 answers

1. ¬ Bob had both fuel and either a match or a lighter

¬ (Bob had fuel ∧ Bob had either a match or a lighter)

¬ (Bob had fuel ∧ (Bob had a match ∨ Bob had a lighter))

¬ (F ∧ (M ∨ L))

not both F and either M or L

F: Bob had fuel; L: Bob had a lighter; M: Bob had a match

2. ¬ ((Carol saw Ann ∧ Carol saw Bill) ∨ (Dave saw Ann ∧ Dave saw Bill))

¬ (Carol saw both Ann and Bill ∨ Dave saw both Ann and Bill)

Neither Carol nor Dave saw both Ann and Bill

3.

	B	(3)
	A ∧ ¬ B	2
2 Ext	A	
2 Ext	¬ B	(3)
	●	
3 Nc	⊥	1
1 RAA	¬ (A ∧ ¬ B)	

4.

	¬ (A ∧ B)	3
	C ∧ ¬ B	
2 Ext	C	
2 Ext	¬ B	
	¬ A	
	○	¬A, ¬B, C ⊭ ⊥
	⊥	5
5 IP	A	4
	¬ B	
	○	¬ B, C ⊭ ⊥
	⊥	6
6 IP	B	4
4 Cnj	A ∧ B	3
3 CR	⊥	1
1 RAA	¬ (C ∧ ¬ B)	

A B C	¬ (A ∧ B) / ¬ (C ∧ ¬ B)				
T F T	Ⓣ	F	Ⓕ	T T	divides the second gap
F F T	Ⓣ	F	Ⓕ	T T	divides both gaps

5.

	¬ (A ∧ ¬ (B ∧ C))	3	***OR***
	A ∧ ¬ C	2	
2 Ext	A	(5)	
2 Ext	¬ C	(8)	
	●		
5 QED	A	4	
	B ∧ C	7	
7 Ext	B		
7 Ext	C	(8)	
	●		
8 Nc	⊥	6	
6 RAA	¬ (B ∧ C)	4	
4 Cnj	A ∧ ¬ (B ∧ C)	3	
3 CR	⊥	1	
1 RAA	¬ (A ∧ ¬ C)		

	¬ (A ∧ ¬ (B ∧ C))	3
	A ∧ ¬ C	2
2 Ext	A	(3)
2 Ext	¬ C	(5)
3 MPT	B ∧ C	4
4 Ext	B	
4 Ext	C	(5)
	●	
5 Nc	⊥	1
1 RAA	¬ (A ∧ ¬ C)	

6.

	A ∨ (B ∧ C)	2	***OR***
	¬ C	(6)	
	A	(3)	
	●		
3 QED	A	2	
	B ∧ C	4	
4 Ext	B		
4 Ext	C	(6)	
	¬ A		
	●		
6 Nc	⊥	5	
5 IP	A	2	
2 PC	A	1	
1 PE	C ∨ A		

	A ∨ (B ∧ C)	2
	¬ A	(2)
2 MTP	B ∧ C	3
3 Ext	B	
3 Ext	C	(4)
	●	
4 QED	C	1
1 PE	C ∨ A	

Phi 270 F97 test 2

F97 test 2 questions

1. Analyze the sentence below in as much detail as possible and express the result in both symbolic and English notation. Be sure that the unanalyzed components of your answer are complete and independent sentences and try to respect any grouping in the original sentence.

Sam didn't both find the problem and fix it, but either it went away on its own or there was no problem to begin with

2. Synthesize an idiomatic English sentence expressing the proposition which is assigned to the symbolic form below by the intensional interpretation to its right—i.e., give an English sentence whose analysis would be the following:

$$\neg (D \vee M) \wedge H$$

D: Al had directions; H: Al made it home; M: Al had a map

Check each of the following claims of entailment. *Do not use* attachment rules but you may use detachment rules. If a derivation fails, present a counterexample that divides its premises from its conclusion.

3. $\neg B \vDash \neg (A \wedge (B \wedge C))$

4. $A \vee B \vDash C \vee B$

5. Use derivations to show the following entailment. You *may use* attachment rules and using them may make the derivation somewhat shorter.

$$\neg ((A \vee B) \wedge \neg C), A \vDash C$$

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

F97 test 2 answers

1. Sam didn't both find the problem and fix it ∧ either the problem went away on its own or there was no problem to begin with

¬ Sam found the problem and fixed it ∧ (the problem went away on its own ∨ there was no problem to begin with)

¬ (Sam found the problem ∧ Sam fixed the problem) ∧ (the problem went away on its own ∨ ¬ there was a problem to begin with)

$$\neg (F \wedge D) \wedge (A \vee \neg P)$$

both not both F and D and either A or not P

A: the problem went away on its own; D: Sam fixed the problem; F: Sam found the problem; P: there was a problem to begin with

2. ¬ (Al had directions ∨ Al had a map) ∧ Al made it home

¬ Al had directions or a map ∧ Al made it home

Al had neither directions nor a map ∧ Al made it home

Al had neither directions nor a map but he made it home

3.

	¬ B	(4)
	A ∧ (B ∧ C)	2
2 Ext	A	
2 Ext	B ∧ C	3
3 Ext	B	(4)
3 Ext	C	
	●	
4 Nc	⊥	1
1 RAA	¬ (A ∧ (B ∧ C))	

4.

	A ∨ B	2
	¬ C	
	A	
	¬ B	
	○	A, ¬ B, ¬ C ⊭ ⊥
	⊥	3
3 IP	B	2
	B	(4)
	●	
4 QED	B	2
2 PC	B	1
1 PE	C ∨ B	

A	B	C	A ∨ B	C ∨ B
T	F	F	Ⓣ	Ⓕ

5.

	¬ ((A ∨ B) ∧ ¬ C)	2	*OR*
	A	(5)	
	¬ C	(6)	
	¬ B		
	●		
5 QED	A	4	
4 PE	A ∨ B	3	
	●		
6 QED	¬ C	3	
3 Cnj	(A ∨ B) ∧ ¬ C	2	
2 CR	⊥	1	
1 IP	C		

	¬ ((A ∨ B) ∧ ¬ C)	2	
	A	(3)	
	¬ C	(2)	
2 MPT	¬ (A ∨ B)	(4)	
3 Wk	A ∨ B	X,(4)	
	●		
4 Nc	⊥	1	
1 IP	C		

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

Phi 270 F96 test 2

F96 test 2 questions

1. Analyze the sentence below in as much detail as possible. Be sure that the unanalyzed components of your answer are complete and independent sentences and that you respect any grouping in the English.

Either Bob didn't call or neither Alice nor Carol was home

2. Synthesize an idiomatic English sentence expressing the proposition which is assigned to the symbolic form below by the intensional interpretation to its right—i.e., give an English sentence whose analysis would be the following:

$$P \wedge \neg (S \wedge V)$$

P: Ralph went to Portland; S: Ralph went to Seattle; V: Ralph went to Vancouver

Check each of the following claims of entailment. Do not use detachment or attachment rules. If a derivation fails, present a counterexample that divides an open gap.

3. $A \wedge \neg B \vDash \neg (B \wedge C)$

4. $A \wedge \neg B, B \vee C \vDash A \wedge C$

5. $\neg (A \wedge \neg B) \vDash A \vee B$

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

F96 test 2 answers

1. Bob didn't call ∨ neither Alice nor Carol was home

¬ Bob called ∨ ¬ (Alice was home ∨ Carol was home)

¬ B ∨ ¬ (A ∨ C)

either not B or not either A or C

A: Alice was home; B: Bob called ; C: Carol was home

2. Ralph went to Portland ∧ ¬ (Ralph went to Seattle ∧ Ralph went to Vancouver)

Ralph went to Portland ∧ ¬ Ralph went to both Seattle and Vancouver

Ralph went to Portland ∧ Ralph didn't go to both Seattle and Vancouver

Ralph went to Portland but he didn't go to both Seattle and Vancouver

3.

	A ∧ ¬ B	1
1 Ext	A	
1 Ext	¬ B	(4)
	B ∧ C	3
3 Ext	B	(4)
3 Ext	C	
	●	
4 Nc	⊥	2
2 RAA	¬ (B ∧ C)	

4.

	A ∧ ¬ B	1
	B ∨ C	4
1 Ext	A	(3)
1 Ext	¬ B	(6)
	●	
3 QED	A	2
	B	(6)
	¬ C	
	●	
6 Nc	⊥	5
5 IP	C	4
	C	(7)
	●	
7 QED	C	4
4 PC	C	2
2 Cnj	A ∧ C	

5.

	¬ (A ∧ ¬ B)	3
	¬ A	
	¬ B	(6)
	¬ A	
	○	¬ A, ¬ B ⊭ ⊥
	⊥	5
5 IP	A	4
	●	
6 QED	¬ B	4
4 Cnj	A ∧ ¬ B	3
3 CR	⊥	2
2 IP	B	1
1 PE	A ∨ B	

A	B	¬ (A ∧ ¬ B) / A ∨ B
F	F	Ⓣ F T Ⓕ

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