

Phi 270 F05 test 2

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

1. ϕ and ψ are mutually exclusive (i.e., $\phi, \psi \Rightarrow \perp$) if and only if ...

answer

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.**

answer

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

answer

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. $\neg B \Rightarrow \neg (A \wedge (B \wedge C))$

answer

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

answer

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

answer

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

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

answer

Phi 270 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 \wedge Sam didn't apply for the job

\neg the job had both good pay and flexible hours \wedge \neg Sam applied for the job

\neg (the job had good pay \wedge the job had flexible hours) \wedge \neg 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

$(\neg G \wedge \neg F) \wedge \neg A$ would say that the job had neither good pay nor flexible hours, so it is not equivalent to $\neg (G \wedge F) \wedge \neg A$ and it's not correct; $(\neg G \vee \neg F) \wedge \neg A$ 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 \wedge either Nancy or Oscar saw the movie

\neg either Luke or Mary saw the movie \wedge (Nancy saw the movie \vee Oscar saw the movie)

\neg (Luke saw the movie \vee Mary saw the movie) \wedge (Nancy saw the movie \vee Oscar saw the movie)

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

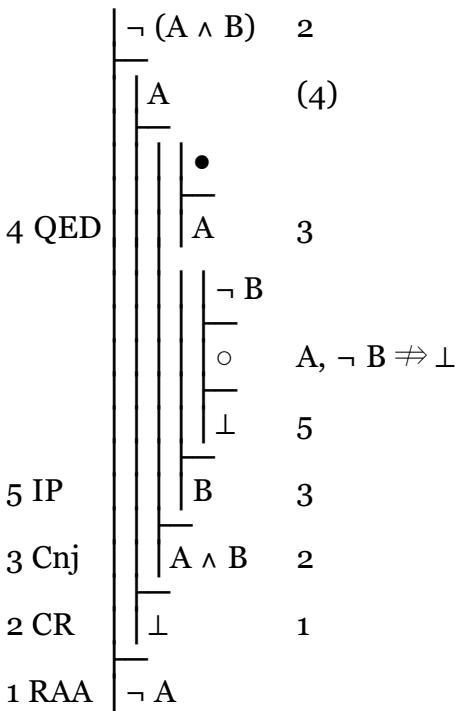
both not either L or M and either N or O

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

$(\neg L \wedge \neg M) \wedge (N \vee O)$ is equivalent to the answer above and is also correct.

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

5.



A B	$\neg(A \wedge B) / \neg A$
T F	Ⓟ F Ⓟ

4 QED

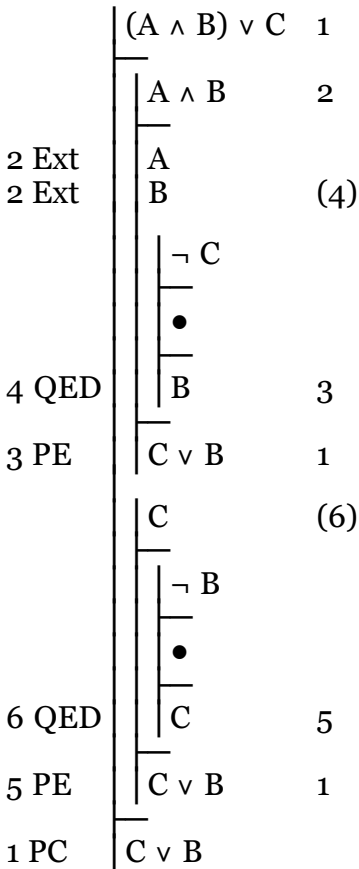
5 IP

3 Cnj

2 CR

1 RAA

6.



2 Ext

2 Ext

4 QED

3 PE

6 QED

5 PE

1 PC

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.

	$A \vee B$	2
	$\neg (B \wedge C)$	1
	C	(1)
1 MPT	$\neg B$	(2)
2 MTP	A	(3)
	•	
3 QED	A	

	$A \vee B$	1
	$\neg (B \wedge C)$	4
	C	(7)
	A	(2)
	•	
2 QED	A	1
	B	(6)
	$\neg A$	
	•	
6 QED	B	5
	•	
7 QED	C	5
	$B \wedge C$	4
	•	
5 Cnj	$B \wedge C$	4
	\perp	3
	•	
4 CR	\perp	3
	A	1
	•	
3 IP	A	1
	•	
1 PC	A	