

Phi 270 F97 test 2

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

answer

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*

answer

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

answer

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

answer

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

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

answer

6. [This question was on a topic not covered in Fo6] Use a series of replacements to show the following:

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

answer

Phi 270 F97 test 2 answers

1. Sam didn't both find the problem and fix it \wedge either the problem went away on its own or there was no problem to begin with
 \neg Sam found the problem and fixed it \wedge (the problem went away on its own \vee there was no problem to begin with)
 \neg (Sam found the problem \wedge Sam fixed the problem) \wedge (the problem went away on its own \vee \neg 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. $\neg (A \text{ had directions } \vee A \text{ had a map}) \wedge A \text{ made it home}$

$\neg A \text{ had directions or a map } \wedge A \text{ made it home}$

$A \text{ had neither directions nor a map } \wedge A \text{ made it home}$

$A \text{ had neither directions nor a map but he made it home}$

3.

	$\neg B$	(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
4 Nc		
1 RAA	$\neg (A \wedge (B \wedge C))$	

4.

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

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

5.

$\neg((A \vee B) \wedge \neg C)$ A <hr style="border: 0.5px solid black;"/> $\neg C$ <hr style="border: 0.5px solid black;"/> $\neg B$ <hr style="border: 0.5px solid black;"/> \bullet <hr style="border: 0.5px solid black;"/> A <hr style="border: 0.5px solid black;"/> $A \vee B$ <hr style="border: 0.5px solid black;"/> \bullet <hr style="border: 0.5px solid black;"/> $\neg C$ <hr style="border: 0.5px solid black;"/> $(A \vee B) \wedge \neg C$ <hr style="border: 0.5px solid black;"/> \perp <hr style="border: 0.5px solid black;"/> C	2 (5) (6) 4 3 3 2 1
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OR

$\neg((A \vee B) \wedge \neg C)$ A <hr style="border: 0.5px solid black;"/> $\neg C$ <hr style="border: 0.5px solid black;"/> $\neg(A \vee B)$ $A \vee B$ <hr style="border: 0.5px solid black;"/> \perp <hr style="border: 0.5px solid black;"/> C	2 (3) (2) (4) X,(4) 1 1 IP
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5 QED
4 PE

6 QED
3 Cnj
2 CR
1 IP

2 MPT
3 Wk
4 Nc

6. [This question was on a topic not covered in Fo6]

$$\begin{aligned}
 & \neg(A \vee (B \wedge C)) \\
 & \Leftrightarrow \\
 & \neg A \wedge \neg(B \wedge C) \\
 & \Leftrightarrow \\
 & \neg A \wedge (\neg B \vee \neg C) \\
 & \Leftrightarrow \\
 & (\neg A \wedge \neg B) \vee (\neg A \wedge \neg C) \\
 & \Leftrightarrow \\
 & \neg(A \vee B) \vee (\neg A \wedge \neg C)
 \end{aligned}$$