

Mixed Counterfactuals

For practice you might do the following. Assuming Stalnaker's semantics, give a falsifying model for every invalid wff, and a semantic validity proof for every valid wff. If changing to Lewis's semantics would change the status of a wff, indicate this.

1. $((P \Box \rightarrow Q) \rightarrow P) \rightarrow P$
2. $((P \Box \rightarrow Q) \rightarrow P) \Box \rightarrow P$
3. $\Box(P \rightarrow Q) \rightarrow ((R \Box \rightarrow P) \rightarrow (R \Box \rightarrow Q))$
4. $(P \rightarrow Q) \rightarrow ((R \Box \rightarrow P) \rightarrow (R \Box \rightarrow Q))$
5. $((Q \wedge R) \Box \rightarrow S) \rightarrow (((P \Box \rightarrow Q) \wedge (P \Box \rightarrow R)) \rightarrow (P \Box \rightarrow S))$
6. $(P \Box \rightarrow (Q \wedge R)) \rightarrow ((P \Box \rightarrow Q) \wedge (P \Box \rightarrow R))$
7. $((P \Box \rightarrow Q) \wedge (P \Box \rightarrow R)) \rightarrow ((P \wedge Q) \Box \rightarrow R)$
8. $((P \Box \rightarrow R) \wedge (Q \Box \rightarrow R)) \rightarrow ((P \vee Q) \Box \rightarrow R)$
9. $(P \Box \rightarrow Q) \vee (Q \Box \rightarrow P)$
10. $(P \Box \rightarrow (Q \Box \rightarrow R)) \rightarrow ((P \Box \rightarrow Q) \rightarrow (P \Box \rightarrow R))$
11. $((P \Box \rightarrow Q) \wedge (Q \Box \rightarrow P)) \rightarrow ((P \Box \rightarrow R) \leftrightarrow (Q \Box \rightarrow R))$
12. $P \Box \rightarrow ((P \Box \rightarrow Q) \rightarrow Q)$
13. $((P \vee Q) \Box \rightarrow R) \rightarrow ((P \Box \rightarrow R) \vee (Q \Box \rightarrow R))$
14. $P \rightarrow ((P \Box \rightarrow Q) \leftrightarrow Q)$
15. $(P \wedge (P \Box \rightarrow Q)) \rightarrow Q$
16. $((P \Box \rightarrow Q) \wedge \sim Q) \rightarrow \sim P$
17. $((P \wedge Q) \Box \rightarrow R) \rightarrow (P \Box \rightarrow (Q \rightarrow R))$

$$18. \sim\Diamond P \rightarrow (P\Box\rightarrow Q)$$

$$19. (P\wedge\sim P)\Box\rightarrow Q$$

$$20. (P\Box\rightarrow(Q\rightarrow R))\rightarrow((P\wedge Q)\Box\rightarrow R)$$

$$21. (P\Box\rightarrow Q)\rightarrow(\sim Q\rightarrow\sim P)$$

$$22. \sim(P\Box\rightarrow Q)\rightarrow\Diamond P$$