

Philosophy 4310 — Assignment #1

This assignment is to be turned in at the beginning of class on Tuesday, Jan 31st. You are encouraged to work in groups on this homework and if you make a serious effort on a problem and get it wrong then you may redo the problem at a later time.

Part I. Truth Tables

For #1 and #2, say whether the sentence is a logical truth, a contradiction, or neither and prove your answer by producing a truth table. For #3 and #4, say whether the argument is valid or not and produce a truth table.

1. $(A \supset B) \supset \sim(A \supset \sim B)$
2. $(A \supset B) \supset ((B \supset C) \supset (A \supset C))$
3. $A \supset (B \supset C)$ and $A \supset \sim C$ so therefore $A \supset \sim B$
4. $(A \supset B) \vee (A \supset C)$ so therefore $(A \vee B) \supset C$

Part II. Natural Deduction

Prove that each of these sequents is valid by producing a natural deduction proof. You may use A, MP, MT, CP, DN, and RAA (and \perp I if you are using LPL). For a real challenge, don't use RAA on #9 or #10 – you would have to use MT instead.

5. $G \supset J, J \supset (F \supset H) \quad \vdash \quad F \supset (G \supset H)$
6. $G \supset F, J \supset (H \supset G) \quad \vdash \quad \sim F \supset (J \supset \sim H)$
7. $(C \supset D) \supset A, C \supset \sim B \quad \vdash \quad (\sim D \supset B) \supset A$
8. $((S \supset T) \supset R) \supset Q, P \supset S \quad \vdash \quad ((P \supset T) \supset R) \supset Q$
9. $\sim(P \supset Q) \quad \vdash \quad \sim Q$
10. $\sim(P \supset Q) \quad \vdash \quad Q \supset P$
11. $\vdash ((P \supset Q) \supset P) \supset P$

Part III. There are three defendants – A, B, and C – and the following facts are known:

1. If A is innocent, then both B and C are guilty.
2. If either A or B is guilty, then C is also guilty.
3. If B is guilty, then both A and C are innocent.

Note that (before examining the problem) you do not know how many of these defendants are guilty; it may be 0, 1, 2, or all 3. Who is innocent and who is guilty? Explain your answer (reasoning in English). Also prove that your answer is correct with truth tables and then also prove that your answer is correct with a natural deduction.