Exercises

Melvin Fitting

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1. Give a classical tableau proof of $(X \supset (Y \supset Z)) \supset ((X \supset Y) \supset (X \supset Z))$. Then convert it to a sequent proof.

2. Give a classical tableau proof of the following.

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

3. If $\mathcal{H}$ is downward saturated, it can't contain $T\,P$ and $F\,P$ for any *propositional letter* P. This is by definition. Show $\mathcal{H}$ can't contain $T\,X$ and $F\,X$ for *any* formula X.

4. Give a proof that if boolean valuations v_1 and v_2 agree on propositional letters, then they agree on all formulas. You can assume that $\supset$ is the only connective.

5. For classical propositional tableaus, show that any maximally consistent set is downward saturated.

6. Can you give an intuitionistic proof for 2?

7. Give an intuitionistic tableau proof, or a Kripke counter-model for each of the following.

   (a) $(A \supset (B \vee C)) \supset ((A \supset B) \vee (A \supset C))$

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