Test 1

Nov 10, 2014

Remark: Each of the following four problems is valued max. 2 pts. Totally max. 8 pts.

Let $T = \{(p \vee q) \to \neg r, \ \neg r \to (p \wedge \neg q)\}$ be a theory over $\mathbb{P} = \{p, q, r\}$.

1. Applying *transformation rules* to the conjunction of all axioms of T find a theory equivalent to T with a single axiom in

   (a) CNF,

   (b) DNF.

2. Applying the tableau method determine all models of T. *Hint:* $|M^{\mathbb{P}}(T)| = 2$.

3. By constructing a finished tableau from T prove that the following proposition is valid in T or provide a counterexample.

   (a) $\neg q$

   (b) $p \wedge q$

4. Determine the numbers of (mutually) nonequivalent propositions over the following languages that are independent in T. Provide an explanation how you derived this number.

   (a) $\mathbb{P} = \{p, q, r\}$

   (b) $\mathbb{P}' = \{p, q, r, s\}$