INFORMATIK

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UNIVERSITAS SARAVIENSIS

Harald Ganzinger
Uwe Waldmann

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Tutorials for "Logic in Computer Science"
Exercise sheet 8

Exercise 8.1:
Compute maximal strict tableaux for the following sets of formulas and explain whether the paths/the tableaux are closed. (Use exactly the expansion rules on Slide 151; don't use shortcuts.)

(a) $\{\neg((\neg p \rightarrow q) \rightarrow (p \wedge q))\}$

(b) $\{p \vee q,\ \neg p \vee q,\ p \vee \neg q,\ \neg p \vee \neg q\}$

Exercise 8.2:
Theorem 1.48 states that the set of all formulas on a maximal open path of a propositional tableau is satisfiable. The proof of Theorem 1.48 that is given on Slide 156 works only for clausal tableaux. Give a proof for arbitrary propositional tableaux. (Hint: Prove first that the set of all atoms and negated atoms occurring on a maximal open path is satisfiable; then use induction. Omit the subproofs for $\rightarrow$, $\leftarrow$, $\uparrow$, $\downarrow$.)

Exercise 8.3:
Compute a closed tableau for

$$\Big\{\Big(\forall x\, \exists y\, \Big(p(x,x) \rightarrow \neg p(x,y)\Big)\Big) \wedge \Big(\exists x\, \forall y\; p(x,y)\Big)\Big\}$$

Exercise 8.4:
Prove the following subcase of Theorem 1.50: If T is a satisfiable tableau, then the tableau T' that results by applying the δ-expansion rule to T is also satisfiable.

Put your solution into the mail box at the door of room 627 in the MPI building (46.1) before June 13, 11:00 (Group D: before June 17, 11:00). Don't forget to write your name and the name of your tutorial group (B, C, D) on your solution.