Universität des Saarlandes

FR Informatik

max planck institut informatik

Tutorials for "Automated Reasoning"
Exercise sheet 8

Exercise 8.1: *(4 P)*
Apply acnf to the formula

$$\neg((P \vee Q) \to (P \leftrightarrow (Q \vee (R \to \bot))))$$

Exercise 8.2: *(4 P)*
Check via the CDCL calculus ($\Rightarrow_{\mathrm{CDCL}}$) whether the following set of clauses is satisfiable or not.

$$N = \{\neg P_1 \vee Q \vee P_3, \neg P_2 \vee P_1 \vee R, P_2 \vee P_1 \vee R, \neg R \vee Q, \neg P_3 \vee R, \neg P_1 \vee \neg Q, \neg P_3 \vee P_1\}$$

Exercise 8.3: *(2+2+2 P)*
Prove or give a counter example for the following statements.

1. If for the formula $\phi_1 \vee \phi_2$ there is a valuation $\mathcal{A}$ with $\mathcal{A}(\phi_1) = 1$ then $\phi_1 \vee \phi_2$ is satisfiable.

2. If for the formula $\phi_1 \wedge \phi_2$ there are two valuations $\mathcal{A}_1, \mathcal{A}_2$ with $\mathcal{A}_1(\phi_1) = 1$ and $\mathcal{A}_2(\phi_2) = 1$ then $\phi_1 \wedge \phi_2$ is satisfiable.

3. Let ϕ contain propositional variables $P_1, \ldots, P_n$. Let ϕ' be obtained from ϕ by replacing every occurrence of a P_i by $\neg P_i$. Then ϕ is valid iff ϕ' is.

Submit your solution in lecture hall E1.3, Room 002 during the lecture on December 16. Please write your name and the date of your tutorial group (Mon, Thu) on your solution.

Joint solutions are not permitted, please submit individually. However, I encourage you working and solving the exercises in a group.