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Tutorials for “Automated Reasoning”
Exercise sheet 7

Exercise 7.1: (4 P)

Prove the following statement: If N is a set of propositional formulas and C is a propositional formula such that $N \models C$, then there exists a finite subset $M \subseteq N$ such that $M \models C$.

Exercise 7.2: (5 P)

Let $\Sigma = (\Omega, \Pi)$ be a signature such that Ω contains at least one constant symbol. A Σ -algebra \mathcal{A} is called *term-generated*, if every $a \in U_{\mathcal{A}}$ is term-generated. Prove that a closed prenex formula without existential quantifiers (possibly including equality) has a model if and only if it has a term-generated model.

Exercise 7.3: (3+3 P)

Using the (i) standard and the (ii) polynomial unification rules, compute most general unifiers of $P(g(x_1, g(f(x_3), x_3)), g(h(x_4), x_3))$ and $P(g(x_2, x_2), g(x_3, h(x_1)))$, if they exist.

Exercise 7.4: (5 P)

Prove that the relation \Rightarrow_{PU} (rule-based polynomial unification) is terminating. Hint: The first component of the lexicographic combination of orderings used to prove termination of \Rightarrow_{SU} can be kept, but the second one cannot, due to the last rule for \Rightarrow_{PU} .

Submit your solution in lecture hall E1.3, Room 002 during the lecture on December 15 or send it in PDF format via e-mail to your tutor(s) until December 15, 18:00.

Joint solutions, prepared by up to three persons together, are allowed (but not encouraged). If you prepare your solution jointly, submit it only once and indicate all authors on the sheet.