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July 8, 2020

Tutorials for “Automated Reasoning II”
Exercise sheet 7

Exercise 7.1:

Let N be a set of equational clauses such that $\perp \notin N$. In Thm. 3.9, we have shown that whenever N is saturated up to redundancy, then every ground instance $C\theta \in G_\Sigma(N)$ is either productive or true in $R_{C\theta}$. The converse does not hold, not even for ground unit clauses: Give a (small) set of ground unit clauses N such that $\perp \notin N$ and every $C \in N$ is either productive or true in R_C , but N is not saturated up to redundancy.

Exercise 7.2:

Refute the following set of clauses by hierarchic superposition; use linear rational arithmetic as base specification. The constants b and c are assumed to be Skolem constants of the base signature.

$$f(f(x+1)) \approx x \quad (1)$$

$$f(b) \approx c \quad (2)$$

$$f(c) \approx b+1 \quad (3)$$

Exercise 7.3:

Compute minimal complete sets of unifiers for the following equality problems. (There is no need to construct and solve diophantine equation systems; the solutions are relatively obvious.)

(1) $\{x + y \approx a + b\}$ w. r. t. ACU.

(2) $\{x + y \approx a + b\}$ w. r. t. AC.

(3) $\{x + y \approx x\}$ w. r. t. ACU.

(4) $\{x + y \approx x\}$ w. r. t. AC.

(5) $\{x + y + a \approx z + b\}$ w. r. t. ACU.

(6) $\{x + y + a \approx z + z\}$ w. r. t. ACU.

(7) $\{a + x + x \approx y + b\}$ w. r. t. A.

Submit your solution (or solution attempt) by e-mail to uwe@mpi-inf.mpg.de, subject Ex 7. until July 14.