max planck institut
informatik

Universität
des
Saarlandes
FR Informatik

Uwe Waldmann **June 7, 2022**

Tutorials for "Automated Reasoning II"
Exercise sheet 5

Exercise 5.1:
On page 50 of the lecture notes it is stated that the ordering restrictions of the inference rules of the superposition calculus must be satisfied *after applying the mgu to the premises.* Give a simple example that shows that a literal may be maximal in a clause, but that the maximality requirement may be violated after applying the mgu.

Exercise 5.2:
Compute the rewrite systems R_C and R_∞ for the set of ground clauses N:

$$f(a) \approx d \lor f(a) \approx c \quad (1)$$
$$a \not\approx d \lor f(b) \approx f(d) \quad (2)$$
$$f(c) \approx f(d) \quad (3)$$
$$f(d) \approx d \lor f(d) \approx b \quad (4)$$
$$a \approx b \quad (5)$$
$$c \approx d \quad (6)$$

Use the KBO with $f > a > b > c > d$ and weight 1 for all symbols as term ordering. Which is the smallest clause $C \in N$ such that C is neither productive nor true in R_C? Use it to show that N is not saturated up to redundancy.

Exercise 5.3:
Compute R_∞ for the clause set $\{f(x) \approx b\}$ and the signature $\Sigma = (\{f/1, g/1, b/0\}, \emptyset)$; use the LPO with $g > f > b$.

Exercise 5.4:
Prove the lifting lemma (Lemma 3.7) for the equality factoring inference rule.

Bring your solution (or solution attempt) to the tutorial on June 14.