max planck institut
informatik

Universität des Saarlandes
FR Informatik

Bromberger/Möhle/Schwarz/Weidenbach **January 26, 2023**

Tutorials for "Automated Reasoning WS22/23"
Exercise sheet 13

Exercise 13.1:
Compute all critical pairs of the two rewrite rules

$$\begin{array}{lcl} f(x, f(x, y)) & \rightarrow & g(y, x) \\ g(f(x, y), y) & \rightarrow & g(x, y) \end{array}$$

Exercise 13.2:
Apply KBC to the set of equations

$$E = \{f(x, f(x, y)) \approx g(y, x),\ f(x, x) \approx x\}$$

by

1. first choosing a KBO, all weight one, and $g \succ f$ that orients the first equation from left to right
2. second choosing an ordering that orients the first equation from right to left

Exercise 13.3:
Refute the following set of equational clauses by superposition:

$$\begin{array}{cc} f(x) \not\approx a \vee f(x) \approx b & (1) \\ f(f(x)) \approx x & (2) \\ a \not\approx b & (3) \end{array}$$

Choose an appropriate ordering and perform only inferences that satisfy the ordering restrictions.

Exercise 13.4:
Consider the following clause set N with respect to an LPO where $g \succ f \succ b \succ a$.

$$N = \{f(a, b) \approx b, b \approx a \vee b \approx g(a), b \not\approx g(b), f(a, g(a)) \approx g(b), b \not\approx a\}$$

1. Compute $N_{\mathcal{I}}$.
2. Determine the minimal false clause.
3. Compute the superposition inference out of 2., add it to the clause set N compute the new respective $N_{\mathcal{I}}$.

It is not encouraged to prepare joint solutions, because we do not support joint exams.