TECHNISCHE UNIVERSITÄT DRESDEN

**Faculty of Computer Science** Institute of Theoretical Computer Science, Chair of Automata Theory

# Term Rewriting Systems

## Exercise Sheet 6

Prof. Dr.-Ing. Franz Baader / Dr. rer. nat. Marcel Lippmann
Summer Semester 2016

### Exercise 27

Let $u$, $x$, $y$, and $z$ be variables. Use the unification algorithm introduced in the lecture to solve the following two unification problems:

a) $S_1 := \{f(h(x), g(x, u)) \stackrel{?}{=} f(z, g(f(y, y), z))\}$

b) $S_2 := \{h(x, g(x, y), y) \stackrel{?}{=} h(x, g(a, y), y),\ z \stackrel{?}{=} h(x, g(x, b), b)\}$

### Exercise 28

From the unification algorithm introduced in the lecture, design a direct decision procedure for the matching problem.

**Hint:**
'Direct' means that no constants are introduced in the right term. Instead, the rules are to be modified such that the new algorithm returns 'the input terms do not match' or a matcher for the input terms as soon as possible.

### Exercise 29

Prove the undecidability of the *uniform* halting problem by a reduction of the halting problem.