



Christoph Weidenbach

January 15, 2019

Tutorials for “Automated Reasoning WS18/19”  
Exercise sheet 11

**Exercise 11.1 (4.25):**

Apply the Knuth-Bendix procedure to the set of equations

$$\{ f(f(x)) \approx g(x), f(a) \approx b \}$$

and transform it into a finite convergent term rewrite system; use the Knuth-Bendix ordering with weight 1 for all function symbols and variables and the precedence  $g > f > a > b$ .

**Exercise 11.2 (4.28):**

Apply  $\Rightarrow_{KBC}$  to the following set of equations. Choose an appropriate ordering. As usual one sort for everything.

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

**Exercise 11.3 (6.1):**

Prove that the following ground equations are unsatisfiable:  $f(a, g(a)) \approx f(b, g(b))$ ,  $g(a) \approx h(c)$ ,  $h(d) \approx g(b)$ ,  $d \approx c$ ,  $f(a, h(d)) \approx f(h(d), a)$ ,  $f(b, g(b)) \not\approx f(h(c), a)$  both using  $\Rightarrow_{KBC}$  and  $\Rightarrow_{CC}$

**Exercise\* 11.4 ( 6.4):**

Prove that  $\Rightarrow_{CCF}$  terminates.

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