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Tutorials for "Automated Reasoning"
Exercise sheet 13

Note the non-standard submission date!

Exercise 13.1: (*4 Bonus Points*)
Use unfailing completion to transform the set of equations

$$\{\, a \approx b,\ a + c \approx d,\ x + y \approx y + x \,\}$$

into a ground convergent set of equations; use an LPO with precedence $+ > a > b > c > d$.

Exercise 13.2: (*4 Bonus Points*)
Let $\Sigma = (\Omega, \emptyset)$ with $\Omega = \{b/0,\ f/1,\ g/1\}$. Which ground terms are in T_∞ for the following TRS?

$$f(f(b)) \to g(b) \qquad (1)$$
$$g(x) \to g(f(x)) \qquad (2)$$

Exercise 13.3: (*4+4+2 Bonus Points*)

(a) Let $\Sigma = (\Omega, \emptyset)$ with $\Omega = \{f/2,\ g/2,\ h/1,\ k/1,\ l/1,\ b/0\}$. Compute the dependency pairs of the following TRS R:

$$f(x, x) \to h(g(x, k(l(x)))) \qquad (1)$$
$$g(h(x), y) \to f(h(y), x) \qquad (2)$$
$$k(g(x, x)) \to k(b) \qquad (3)$$
$$l(h(x)) \to h(x) \qquad (4)$$

(b) Compute the approximated dependency graph (using cap and ren) for R and use it to show that R is terminating.

(c) For R, the exact dependency graph and the approximated dependency graph as defined in Sect. 5.1 of the lecture do *not* agree. Where do they differ?

Submit your solution during the lecture on February 3 (Monday!). Please write your name and the date of your tutorial group (Tue, Wed) on your solution.

Joint solutions, prepared by up to three persons together, are allowed (but not encouraged). If you prepare your solution jointly, submit it only once and indicate all authors on the sheet.