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14. Exercises for the lecture **Term Rewriting Systems**

Exercise 58:

(a) Apply the basic completion procedure to the following sets of identities:

$$\begin{aligned} E_1 &:= \{f(g(f(x))) \approx x\} \\ E_2 &:= \{f(g(f(x))) \approx f(g(x))\} \end{aligned}$$

(b) What happens when the improved completion procedure that also simplifies rules is applied to E_1?

Exercise 59:

Show that the encompassment quasi-order $\gtrsim$ is in fact a quasi order and that the associated strict order $\sqsupset$ is a well-founded strict order.

Exercise 60:

Let $\equiv$ denote the equivalence relation associated to $\underset{\sim}{\sqsupset}$ i. e., $s \equiv t$ iff $s \underset{\sim}{\sqsupset} t$ and $t \underset{\sim}{\sqsupset} s$. Show that:

(a) $s \equiv t$ if and only if s and t are equal up to renaming.

(b) for every term s only finitely many (up to renaming) terms t_i exist such that $s \underset{\sim}{\sqsupset} t_i$