Prof. Dr. Jürgen Giesl

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Notes:

- Please solve these exercises in **groups of two**!

- The solutions must be handed in **directly before (very latest: at the beginning of)** the exercise course on **Wednesday, July 6th, 2011**, in lecture hall **AH 2**. Alternatively you can drop your solutions into a box which is located right next to Prof. Giesl's office (until the exercise course starts).

- Please write the **names** and **immatriculation numbers** of all (two) students on your solution. Please staple the individual sheets!

Exercise 1 (Advanced Completion Algorithm): (3 points)

Please use the advanced completion algorithm from the lecture to generate a convergent TRS of **just three rules** that is equivalent to the following set of equations:

$$\{f(f(x)) \equiv h(x), f(g(x)) \equiv f(x), f(x) \equiv g(x)\}$$

Write down the single steps of the algorithm using the following notation and indicate which transformation rule you apply to which term equation or rewrite rule:

$$\frac{\mathcal{E}_1, \mathcal{R}_1}{\frac{\mathcal{E}_2, \mathcal{R}_2}{\frac{\mathcal{E}_3, \mathcal{R}_3}{\cdots}}}$$

As reduction order $\succ$, use the LPO with precedence $f \sqsupset h \sqsupset g$. In this exercise you do not need to give a proof for $s \succ t$ if you generate a new rule $s \to t$ (but this statement should be true, of course).

Exercise 2 (Advanced Completion Algorithm): (10 points)

Please use the advanced completion algorithm from the lecture to generate a convergent TRS of **at most five rules** that is equivalent to the following set of equations:

$$\{plus(\mathcal{O}, y) \equiv y, plus(s(x), y) \equiv s(plus(x, y)), p(s(x)) \equiv x, s(p(x)) \equiv x\}$$

Use the same notation as in Exercise 1. As reduction order $\succ$, use the LPO with precedence $plus \sqsupset s \sqsupset p \sqsupset \mathcal{O}$. In this exercise you do not need to give a proof for $s \succ t$ if you generate a new rule $s \to t$ (but this statement should be true, of course).