Prof. Dr. Jürgen Giesl Florian Frohn

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 **Friday, January 22th, 2016**, in lecture hall **AH 1**. 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): (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:

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

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:

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

As reduction order $\succ$, use the LPO with precedence $\mathsf{plus} \sqsupset \mathsf{s} \sqsupset \mathsf{p} \sqsupset \mathcal{O}$. 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).