
Theory I, Sheet 10

- The solutions should be submitted in English.
- JUST FOR FUN exercises are not mandatory.
- Your solutions should be delivered to the lockbox in building 051 floor 00, or right before the start of the tutorial (July 9, 4:00 p.m.).
- You are allowed to discuss your solutions with each other. Nevertheless, you are required to write down the answers in your own words.

Exercise 10.1 - Reductions

Let f be a binary function symbol, and

$$\mathcal{E} = \{f(x, f(y, z)) = f(f(x, y), z), f(f(x, y), x) = x\}$$

Show that $f(x, x) \xrightarrow{*}_{\mathcal{E}} x$. For every reduction step, give the identity, the term position, and the substitution (according to the definition of $\rightarrow_{\mathcal{E}}$) you have used.

Exercise 10.2 - Unify Algorithm

Apply the Unify Algorithm to the following unification problems. Specify every transformation step.

- $\{f(x, y) =? f(h(a), x)\}$
- $\{f(x, y) =? f(h(x), x)\}$
- $\{f(x, b) =? f(h(y), z)\}$
- $\{f(x, x) =? f(h(y), y)\}$