2nd tutorial (April 19, 2017)

Formale Baumsprachen

Task 3 (universal algebra)

(a) Recall the following concepts: Σ-algebra, Σ-homomorphism, initial Σ-algebra in a class $\mathcal{K}$, and Σ-term algebra.

(b) Show that the mappings height, size, and sub (restricted to T_Σ) are homomorphisms. Start by giving the target algebra for each of them. What is the problem concerning sub?

(c) Show that the principle of proof by structural induction is correct by applying the above concepts from universal algebra.

Task 4 (bu-det fta)

Let $\Sigma = \{\sigma^{(2)}, \alpha^{(0)}, \beta^{(0)}\}$ and $\Delta = \{\sigma^{(2)}, \gamma^{(1)}, \alpha^{(0)}\}$ be ranked alphabets. Give deterministic buta $\mathcal{A}_1$, $\mathcal{A}_2$, and $\mathcal{A}_3$ that recognize L_1, L_2, and L_3, respectively, where

(a) $L_1 = \{\xi \in T_\Sigma \mid \xi \text{ contains at least one } \alpha \text{ and one } \beta\}$,

(b) $L_2 = \{\xi \in T_\Sigma \mid \xi \text{ contains an even number of } \alpha \text{ symbols}\}$, and

(c) $L_3 = \{\sigma(t_1, \sigma(t_2, ...\sigma(t_n, \alpha)...)) \in T_\Delta \mid n \in \mathbb{N}, t_1, ..., t_n \in T_{\{\gamma^{(1)}, \alpha^{(0)}\}}\}$.

Note The tutorial's time might not suffice for presenting all solutions. Please prepare to ask for the solutions you are most interested in.