3. Übung (2019-04-24)

Formale Baumsprachen

**Task 6 (universal algebra)**

(a) Show that the mapping sub (restricted to $T_\Sigma$) is a homomorphism. Start by giving the target algebra.

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

**Task 7 (bu-det fta)**

Let $\Sigma = \{\sigma^{(2)}, \alpha^{(0)}, \beta^{(0)}\}$ and $\Delta = \{\sigma^{(2)}, \gamma^{(1)}, \alpha^{(0)}\}$ be ranked alphabets. Give deterministic bu-ta $A_1$, $A_2$, and $A_3$ 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) $L_3 = \{\sigma(t_1, \sigma(t_2, \sigma(t_n, \alpha)\ldots)) \in T_{\Delta} \mid n \in \mathbb{N}, t_1, \ldots, t_n \in T_{\{\gamma^{(1)}, \alpha^{(0)}\}}\}$. 