Fourth exercise sheet for the lecture

Syntax Directed Semantics (Part II)

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Exercise 9 ($\boldsymbol{Rec}(\boldsymbol{\Sigma}, \boldsymbol{S}) \subseteq \boldsymbol{Rep}(\boldsymbol{\Sigma}, \boldsymbol{S})$)
Let $\Sigma = \{\sigma^{(2)}, \delta^{(1)}, \alpha^{(0)}\}$ and let $r = \mathit{size}_\delta \in \mathbb{Q}\langle\!\langle T_\Sigma \rangle\!\rangle$ be defined as in the lecture.

1. Starting from the basis $\{\alpha^{-1}r, \delta(\alpha)^{-1}r\}$ of V_r, use the constructive proof from the lecture to obtain a $\mathbb{Q}$-Σ-representation R with $r_R = r$.

2. Compare the resulting $\mathbb{Q}$-Σ-representation to the one given for size_γ in the lecture. Try to analyze and explain the matches as well as the differences. Are they pure coincidences? Or necessities? What would happen when starting from a different basis above? $\diamond$

Exercise 10 ($\boldsymbol{Rep}(\boldsymbol{\Sigma}, \boldsymbol{S}) \subseteq \boldsymbol{Rec}(\boldsymbol{\Sigma}, \boldsymbol{S})$)
Starting from the $\mathbb{Q}$-Σ-representation for size_γ given in the lecture, construct a corresponding weighted automaton. $\diamond$