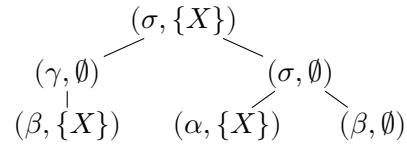# Formale Baumsprachen

## Task 23 (semantics of formulas in weighted MSO)

Let $\Sigma = \{\sigma^{(2)}, \gamma^{(1)}, \alpha^{(0)}, \beta^{(0)}\}$, $\mathcal{V} = \{X\}$, and let $\xi \in T^v_{\Sigma_{\mathcal{V}}}$ be as follows:



(a) Evaluate $[\![\forall x.\neg \mathsf{label}_\beta(x) \vee 2]\!]_{\mathcal{V}}(\xi)$ using the semiring $(\mathbb{N}, +, \cdot, 0, 1)$.

(b) Evaluate $[\![\forall x.\neg \mathsf{label}_\beta(x) \vee (\mathsf{label}_\beta(x) \wedge 2)]\!]_{\mathcal{V}}(\xi)$ using the semiring $(\mathbb{N}, +, \cdot, 0, 1)$.

(c) Evaluate $[\![\exists Y.\forall x.\neg(x \in Y) \vee (x \in Y \wedge x \in X)]\!]_{\mathcal{V}}(\xi)$ using the semiring $(\mathbb{N}, +, \cdot, 0, 1)$.

## Task 24 (unrestricted MSO and recognizability)

Consider the ranked alphabet $\Sigma = \{\gamma^{(1)}, \alpha^{(0)}\}$, the semiring $(\mathbb{N}, +, \cdot, 0, 1)$, and the formulae $\varphi = \forall x.\forall y.2$ and $\psi = \forall X.2$.

(a) Show that $\varphi$ is not restricted.

(b) Show that $[\![\varphi]\!]$ is not recognizable.

(c) Show that $[\![\psi]\!]$ is not recognizable.