Formale Baumsprachen

Task 28 (zigzag is not deterministically recognizable)

Let $\Sigma = \{\sigma^{(2)}, \alpha^{(0)}\}$ be a ranked alphabet and $\text{zigzag} \colon \mathrm{T}_\Sigma \to \mathbb{N}$ a mapping such that

$$\text{zigzag}(\alpha) = 1$$
$$\text{zigzag}(\sigma(\alpha, \xi_1)) = 2$$
$$\text{zigzag}(\sigma(\sigma(\xi_1, \xi_2), \xi_3)) = 2 + \text{zigzag}(\xi_2)$$

(a) Show that zigzag is recognizable over the tropical semiring.

(b) Show that zigzag is *not* bottom-up deterministically recognizable over the tropical semiring.