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14. Exercises for the Course 'Automata and Logic'

Exercise 67:

Let $\Sigma = \{a, b\}$ and $\mathcal{A}$ the Rabin-automaton

$$\mathcal{A} = (\{q_0, q_1, q_2\}, \Sigma, \{q_2\}, \Delta, \{(\{q_0, q_2\}, \{q_1\})\}),$$

where

$$\begin{aligned} \Delta_a : q_0 &\to \{(q_1, q_1)\} & \qquad \Delta_b : q_0 &\to \{(q_0, q_0)\} \\ q_1 &\to \{(q_1, q_1)\} & q_1 &\to \{(q_0, q_0)\} \\ q_2 &\to \{(q_0, q_1)\} & q_2 &\to \{(q_0, q_1)\} \end{aligned}$$

Use the method from the proof of Proposition 7.12 to decide whether $L_\omega(\mathcal{A}) = \emptyset$ or not.

Exercise 68:

Let $\Sigma = \{0, 1\}$ and

$$L = \{t \in \mathbf{T}_\Sigma^\omega \mid \text{for every path } p\text{, if } p \text{ contains a 0, then } p \text{ contains only finitely many 1s}\}.$$

Give an S2S formula φ such that $L_\omega(\varphi) = L$.

Exercise 69:

For the automaton $\mathcal{A}$ from Exercise 67, give an S2S formula φ with $L_\omega(\mathcal{A}) = L_\omega(\varphi)$.