

Automata and Formal Languages — Homework 11

Due 08.01.2016

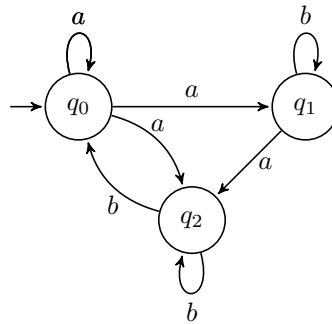
Exercise 11.1

Find ω -regular expressions (the shorter the better) for the following languages:

- (a) $\{w \in \{a, b\}^\omega \mid k \text{ is even for each subword } ba^k b \text{ of } w\}$
- (b) $\{w \in \{a, b\}^\omega \mid w \text{ has no occurrence of } bab\}$

Exercise 11.2

Let A be the following automaton:



- (a) Interpret A as a nondeterministic co-Büchi automaton with $F = \{q_2\}$. Apply the algorithm *NCAtoDCA* from the lecture to determinize A .
- (b) Interpret A as a Muller automaton with the acceptance condition $\{\{q_1\}, \{q_0, q_2\}\}$. Apply the algorithm *NMAtoNGA* and *NGAtoNBA* from the lecture to construct a generalized Büchi automaton and a Büchi automaton that recognize the same language as A .
- (c) Interpret A as a Rabin automaton with the acceptance condition $\{\{\{q_0, q_2\}, \{q_1\}\}\}$. Construct a Büchi automaton that recognizes the same language as A .

Exercise 11.3

Let $A = (Q, \Sigma, \delta, q_0, F)$ be a nondeterministic co-Büchi automaton. Give a translation algorithm that constructs a Büchi automaton A' such that $L_\omega(A) = L_\omega(A')$. What is the complexity of your algorithm?