Theory of Computer Science

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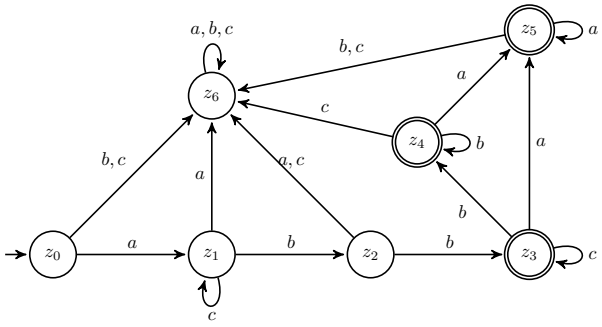
Exercise Sheet 4

Due: Wednesday, March 27, 2019

Exercise 4.1 (DFA and regular grammar; 2 + 2 marks)

Consider the following DFA M:



(a) Which language does the DFA accept?

(b) Specify a *regular* grammar, which generates the same language.

Exercise 4.2 (DFA; 2 Points)

Specify a deterministic finite automaton that accepts the language over $\Sigma = \{a, b\}$ where the words of the language have the following property:

When a occurs at the beginning of the word or after b, then there directly follows at most one further a. When b occurs at the beginning of the word or after a, then there directly follows at least one further b.

Exercise 4.3 (Regular grammar and NFA; 1+1 Points)

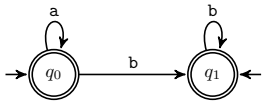
Consider the language $L = \{w \in \{0, 1\}^* \mid w \text{ ends with 01 or with 10}\}$.

(a) Specify a regular grammar that generates L.

(b) Draw the state diagram of an NFA with at most four states that accepts L.

Exercise 4.4 (NFA; 0.5+1.5 Points)

Consider the following NFA M:



(a) What language $\mathcal{L}(M)$ does it accept?

(b) Use the construction from the proof of the Theorem by Rabin & Scott to find a DFA that accepts the same language.