Technische Universität München **Winter term 2015/16**
I7
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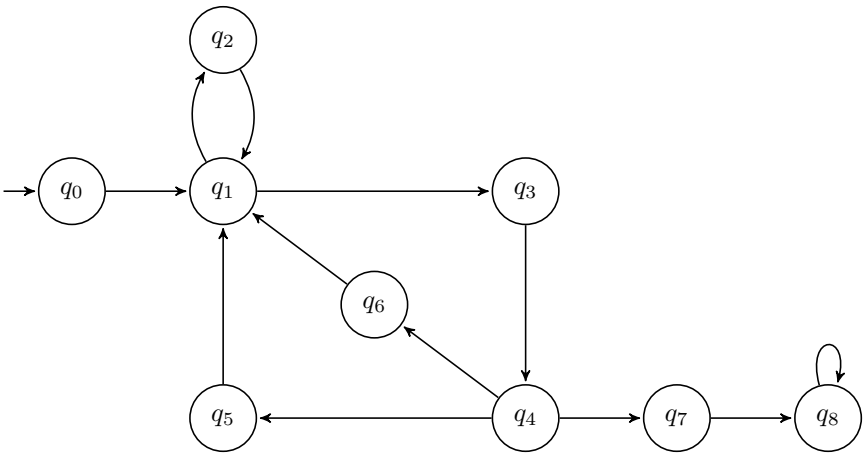
Automata and Formal Languages — Homework 13

Due 22.01.2016

Exercise 13.1

Let A be the following Büchi automaton:



For (a)–(e), let $F = \{q_1, q_6, q_7\}$.

(a) Run the emptiness algorithm *NestedDFS* on A.

(b) Recall that *NestedDFS* is a nondeterministic algorithm, and different choices of runs may return different lassos. Which lassos of the above Büchi automaton can be found by the algorithm?

(c) Give an example search sequence of *NestedDFS* that demonstrates its non-optimality.

(d) Run the emptiness algorithm *TwoStack* on A.

(e) Which lassos of A can be found by *TwoStack*?

(f) Interpreting A as a generalized Büchi automaton with the accepting condition $\{\{q_2\}, \{q_3, q_5\}\}$, run the emptiness algorithm *TwoStackNGA*.

Exercise 13.2

A Büchi automaton is *weak* if no strongly connected component contains both accepting and non-accepting states. Give an emptiness algorithm for weak Büchi automata. What is the complexity of the algorithm?