

Theoretical Computer Science - Bridging Course

Summer Term 2017

Exercise Sheet 2

Hand in (electronically or hard copy) by 12:15 pm, Monday, May 22th, 2017

Exercise 1 (3+2+3 points)

Construct DFAs that recognize the following languages. Drawing the state diagrams is sufficient. The alphabet is $\Sigma = \{0, 1\}$.

- (a) $L_1 = \{w \mid |w| \geq 2 \text{ and } w \text{ contains an even number of zeros}\}$.
- (b) $L_2 = \{w \mid w \text{ contains exactly two ones}\}$.
- (c) $L_3 = \{w \mid w \text{ has an odd number of zeros and ends with } 1\}$.

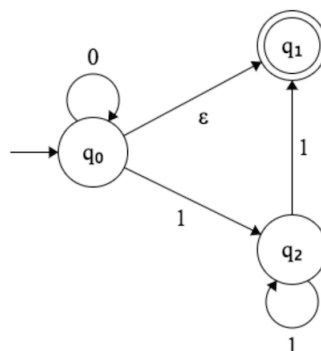
Exercise 2 (2+3 points)

Let L, L_1, L_2 be regular languages. Show that both $\bar{L} := \Sigma^* \setminus L$ and $L_1 \cap L_2$ are regular as well by constructing the corresponding DFAs.

Remark: No need for drawing state diagrams. Show how a DFA for the language in question can be constructed presuming the existence of DFA for L, L_1, L_2 .

Exercise 3 (2+5 points)

Consider the following NFA.



- (a) Give a formal description of the NFA by giving the alphabet, state set, transition function, start state and the set of accept states.
- (b) Construct a DFA which is equivalent to the above NFA by drawing the corresponding state diagram.