

Exercises – Sheet 3

Zürich, October 8, 2021

Exercise 7

Let $n \in \mathbb{N}$. Show that at least half of the words over $\{0, 1\}$ of length at most n are random.

10 points

Exercise 8

Design a finite automaton for each of the following languages, using a graphic representation, and determine the class $\text{Kl}[q]$ for every state q of your automaton.

(a) $L_1 = \{w \in \{a, b\}^* \mid (|w|_a + 2 \cdot |w|_b + 1) \bmod 3 \neq 1\}$,

(b) $L_2 = \{w \in \{a, b\}^* \mid w \text{ does not contain the subword } bab\}$.

10 points

Exercise 9

- (a) Design a finite automaton for the following language, using a graphic representation, and provide a short informal justification of its correctness.

$$L = \{w \in \{a, b\}^* \mid w \text{ contains the subword } ab \text{ as many times as the subword } ba\}.$$

- (b) Determine the class $\text{Kl}[q]$ for every state q of your automaton.

10 points

Submission: On Friday, October 15, 2021, by 11:15 at the latest, as a legible PDF via e-mail directly to the respective teaching assistant.