Formale Systeme Proseminar

Tasks for Week 15

Task 1 Construct a DFA for the language

$$L = \{w \in \{0,1\}^* \mid w \text{ has an odd number of 1's}\}$$

Task 2 Construct a DFA for the language

$$L = \{w \in \{a,b\}^* \mid \text{ every } a \text{ in w is preceeded and followed by a } b\}$$

Task 3 Construct a DFA for the language

$$L = \{w \in \{0,1,2,3,4,5,6,7,8,9\}^* \mid w \text{ as a natural number is divisible by 3 }\}$$

Hint: A natural number is divisible by 3 iff the sum of its digits is divisible by 3.

Task 4 Construct a DFA for the language

$$L = \{w \in \{0\}^* \mid w = o^k \wedge (2|k \vee 3|k)\}$$

Hint: Use the theorem that regular languages are closed under union.

Task 5 Construct a DFA for the language

$$L = \{w \in \{a,b\}^* \mid w \text{ has odd } a\text{'s and even } b\text{'s}\}$$

Task 6 Let M_1 and M_2 be two DFA for the languages L_1 and L_2, respectively. Give a general construction of a DFA M for the language $L = L_1 \cap L_2$.

Hint: Similar as the construction for union presented in class.

Task 7 Construct an NFA for the language

$$L = \{w \in \{0,1\}^* \mid w \text{ ends with 11 or with 101.}\}$$

Task 8 Construct an NFA for the language

$$L = \{w_1 w_2 \in \{0,1\}^* \mid w_1 = 0^{2n}, w_2 = 0^{3m}, \text{ for some } n, m \in \mathbb{N}\}$$