Theory of Computation, Fall 2021
Assignment 1 Solutions

Exercises

Q1. (a) T; (b) T; (c) T.

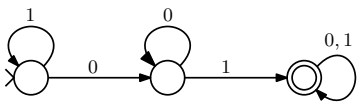
Q2. $(q_1, aab) \vdash_M (q_2, ab) \vdash_M (q_3, b) \vdash_M (q_1, e)$.

Q3. (a) F; (b) T.

Q4. Let $M = (K, \Sigma, \delta, s, F)$. $e \in L(M)$ if and if only $s \in F$.

Q5. (a) no; (b) $L(M) = \{0,1\}^*$.

Q6. The following DFA accepts $\{w \in \{0,1\}^* : 01 \text{ is a substring of } w\}$.



Q7. Let $M_3 = (K_3, \Sigma, \delta_3, s_3, F_3)$ where

- $K_3 = K_1 \times K_2$,
- $s_3 = (s_1, s_2)$,
- $F_3 = \{(q_1, q_2) \in K_1 \times K_2 : q_1 \in F_1 \wedge q_2 \in F_2\}$, and
- $\delta_3((q_1, q_2), a) = (\delta_1(q_1, a), \delta_2(q_2, a))$ for any $q_1 \in K_1$, any $q_2 \in K_2$, and any $a \in \Sigma$.

M_3 accepts $A \cap B$.