

Problem 1

Solve Sipser exercises 0.3, 0.4, 0.5, and problem 0.10.

Problem 2

For a DFA, $M = (Q, \Sigma, \delta, q_0, F)$ in which the set of states is $Q = \{q_1, q_2, q_3, q_4, q_5\}$, $\Sigma = \{a, b\}$, $q_0 = q_1$, $F = \{q_2, q_3, q_4, q_5\}$, and δ is specified by the table:

δ	q_1	q_2	q_3	q_4	q_5
a	q_1	q_3	q_5	q_2	q_4
b	q_2	q_4	q_1	q_3	q_5

Do the following:

- (a) Draw the state diagram of the DFA.
- (b) For the strings below, give the corresponding computation of the automaton and say whether it accepts or rejects them. The definition of computation is given in page 40.
 - (a) baab
 - (b) abbb
 - (c) bbba
- (c) Give a succinct English description of the string accepted by M .

Problem 3

For each of the following languages give a state diagram of a DFA that recognize it. The alphabet is $\Sigma = \{0, 1\}$

- (a) $\{w \mid w \text{ does not contain } 000 \text{ or } 11 \text{ as a substring}\}$
- (b) $\{w \mid w \text{ contain at least two } 0\text{'s and at least two } 1\text{'s}\}$. The 0's and 1's do not need to be consecutive.

Problem 4

Solve Sipser exercises 1.6b, 1.6d, 1.5c, 1.4c.