

Tutorial 2

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Question 1

$$Q = \{s, q1, q2, r1, r2\}$$

$$\Sigma = \{a, b\}$$

$$\delta =$$

	<i>a</i>	<i>b</i>
<i>s</i>	<i>q1</i>	<i>q2</i>
<i>q1</i>	<i>q1</i>	<i>q2</i>
<i>q2</i>	<i>q1</i>	<i>q2</i>
<i>r1</i>	<i>r2</i>	<i>r1</i>
<i>r2</i>	<i>r2</i>	<i>r1</i>

$$q1 = s$$

$$F = \{q1, r1\}$$

Question 2a

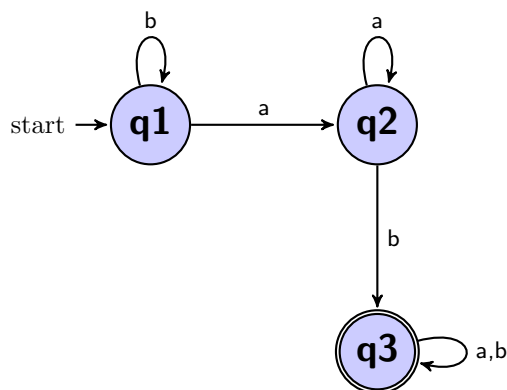


Figure 1: Contains ab as a substring.

DFA = $\{\{q1, q2, q3\}, \{a, b\}, \{(q1, b) \rightarrow q1, (q1, a) \rightarrow q2, (q2, a) \rightarrow q2, (q2, b) \rightarrow q3, (q3, b) \rightarrow q3, (q3, a) \rightarrow q3\}, q1, \{q3\}\}$

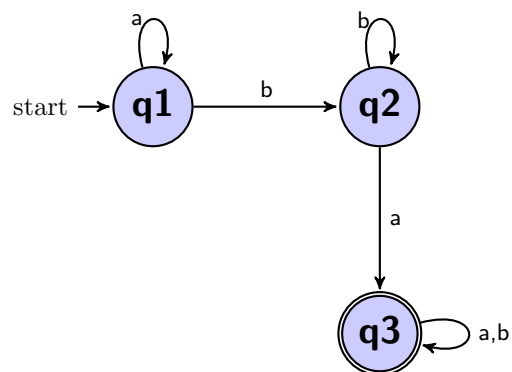


Figure 2: Contains ba as a substring

DFA = $\{\{q1, q2, q3\}, \{a, b\}, \{(q1, a) \rightarrow q1, (q1, b) \rightarrow q2, (q2, b) \rightarrow q2, (q2, a) \rightarrow q3, (q3, a) \rightarrow q3, (q3, b) \rightarrow q3\}, q1, \{q3\}\}$

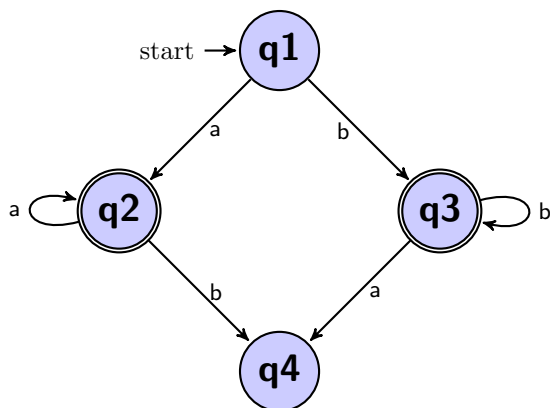


Figure 3: Contains neither the substrings ab nor ba

Question 2b

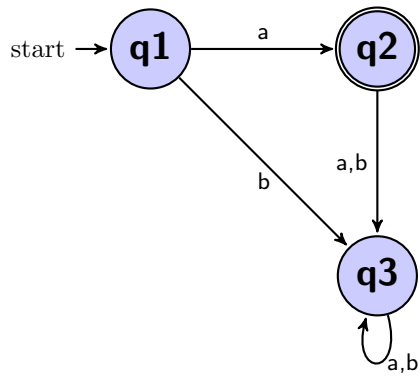


Figure 4: Only allows the string a

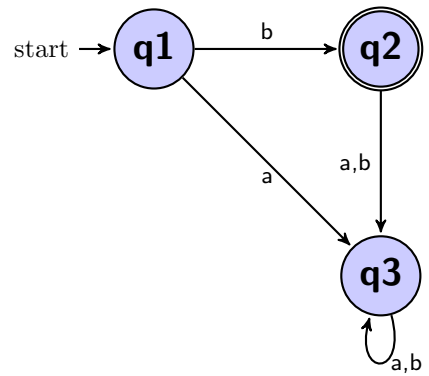


Figure 5: Only allows the string b

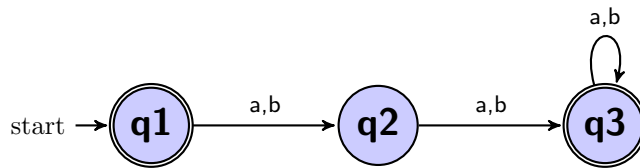


Figure 6: Allowing any strings except a and b

Question 3a

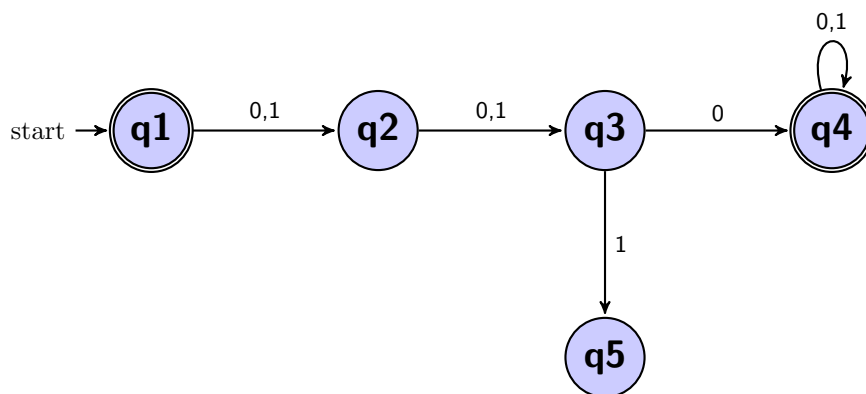


Figure 7: Has the length of atleast 3 and its third symbol is a 0

Question 3b

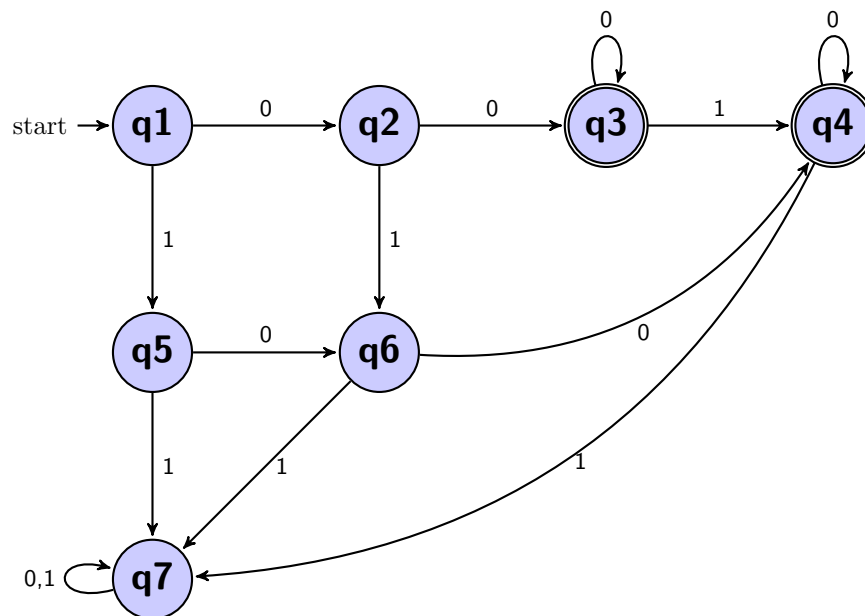


Figure 8: Contains at least two 0s and at most one 1