Exploring DFAs

CS 311, Fall 2015

Exercise 1 Consider the DFA $M_1$ where:

- $Q = \{q_0, q_1, q_2, q_3\}$
- $\Sigma = \{a, b\}$
- $F = \{q_0, q_1\}$

The start state is $q_0$ and the transition function is:

<table>
<thead>
<tr>
<th>$\delta$</th>
<th>$q_0$</th>
<th>$q_1$</th>
<th>$q_2$</th>
<th>$q_3$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$a$</td>
<td>$q_1$</td>
<td>$q_1$</td>
<td>$q_1$</td>
<td>$q_3$</td>
</tr>
<tr>
<td>$b$</td>
<td>$q_3$</td>
<td>$q_2$</td>
<td>$q_2$</td>
<td>$q_3$</td>
</tr>
</tbody>
</table>

a) Draw a state diagram for the DFA $M_1$.

b) What is the language recognized by the DFA $M_1$, $L(M_1)$?

c) Choose an $s \in L(M_1)$ and write down the path of that string through the machine. Now do the same for a string $s' \notin L(M_1)$. 

1
Exercise 2  Draw a state machine for a DFA that recognizes each of the following languages:

a)  $A = \{ w \mid w$ contain neither the substrings 01 nor 10$\}$, $\Sigma = \{0, 1\}$

b)  $B = \{ w \mid w = xbab, \text{ where } x, y \in \Sigma^* \}$, $\Sigma = \{a, b\}$

c)  $C = \{ w \mid \text{every odd position in } w \text{ is a } 2 \}$, $\Sigma = \{0, 1, 2\}$