Solution to some exercises week 3

Languages and Automata

May 17, 2013

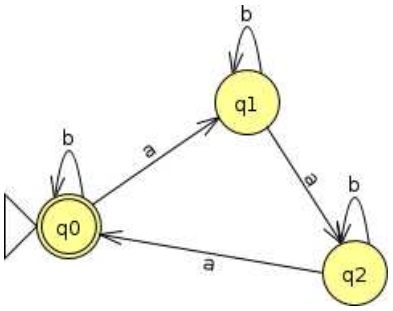
3. Regular languages, Finite Automata

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

3.1. 1. Construct a DFA M_1 such that

$$L(M) = L_1 = \{w \in \Sigma^* \mid \#_a(w) \text{ is divisable by } 3\}.$$

Answer, see figure.

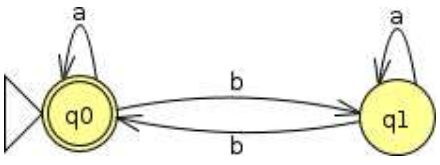


After reading a word, any b doesn't change the state. Reading an 'a' increases modulo 3 the state by 1. Hence q_i indicates that the number of a's mod 3 is i. Therefore q_0 should be the beginning and final state.

2. Construct an M_2 such that

$$L(M) = L_2 = \{w \in \Sigma^* \mid \#_b(w) \text{ is divisable by } 2\}.$$

Answer, see figure.



3. Construct a NFA$_\lambda$ M_3 such that $L(M_3) = L_1 \cup L_2$. Answer, see

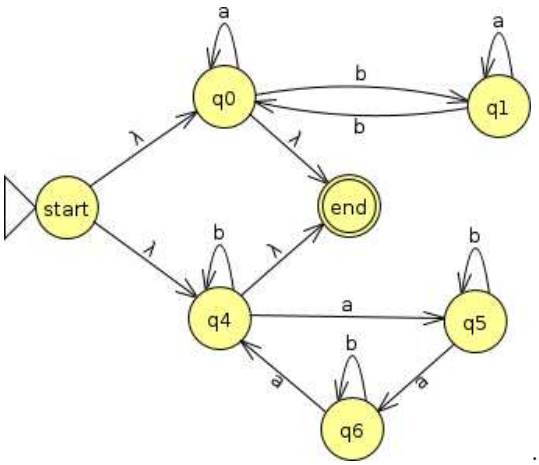


figure .

4. Construct a DFA M_4 such that $L(M_4) = L_1 \cup L_2$. We now have to find a deterministic version of the last NFL$_\lambda$. By the method in the lectures this is