

Solution to some exercises week 3

Languages and Automata

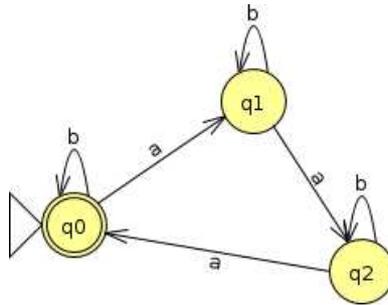
May 10, 2012

3. Regular languages, Finite Automata

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

- 3.1. 1. Construct a DFA M_1 such that

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

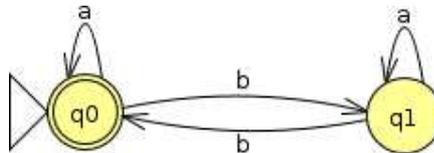


Answer, see figure.

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.

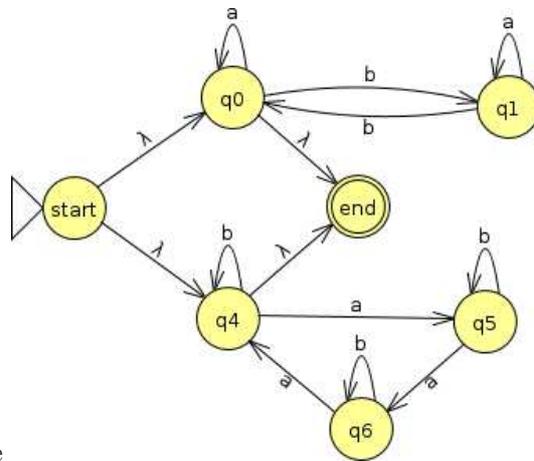
2. Construct an M_2 such that

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



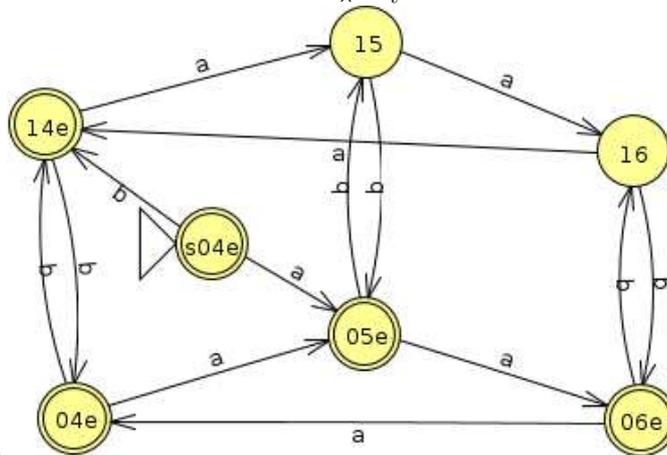
Answer, see figure.

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



figure

- 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_λ . By the method in the



lectures this is