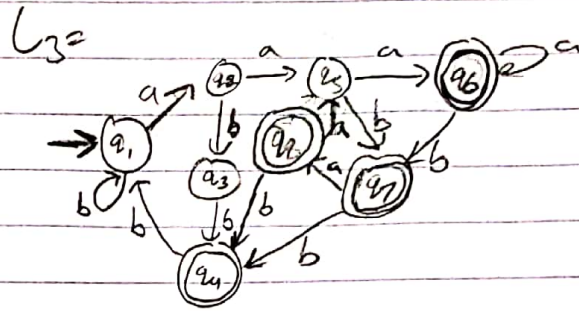
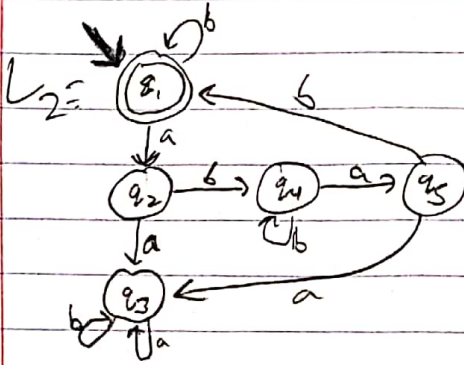
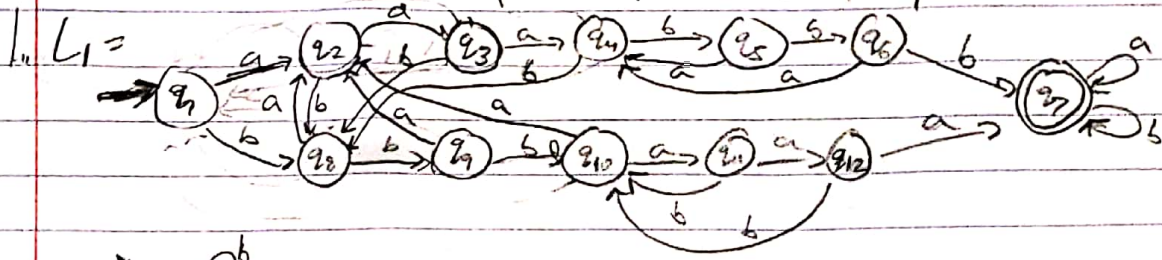


Max Shi

I pledge my honor that I have  
abided by the Stevens Honor System.  
mshw

# CS 334 Problem Set 1



2. Let  $M_1 = (Q_1, \Sigma_1, \delta_1, q_1, F_1)$ ,  $M_2 = (Q_2, \Sigma_2, \delta_2, q_2, F_2)$   
Let  $M = (Q, \Sigma, \delta, q, F)$  where

$$\Sigma = \Sigma_1 \cup \Sigma_2, q = (q_1, q_2),$$

Let  $D_1$  and  $D_2$  represent states where machine 1 or machine 2 received invalid input, respectively.

$$Q = (Q_1 \times Q_2) \cup (Q_1 \times D_2) \cup (D_1 \times Q_2) \cup \{(D_1, D_2)\}$$

$$F = (F_1 \times F_2) \cup (F_1 \times Q_2) \cup (F_1 \times D_2) \cup (D_1 \times F_2)$$

$$\delta((r_1, r_2), a) = \begin{cases} a \in \Sigma_1 \wedge a \in \Sigma_2, (\delta_1(r_1, a), \delta_2(r_2, a)) \\ a \in \Sigma_1 \wedge a \notin \Sigma_2, (\delta_1(r_1, a), D_2) \\ a \notin \Sigma_1 \wedge a \in \Sigma_2, (D_1, \delta_2(r_2, a)) \end{cases}$$

$$\text{and } \delta_1(q_1, a) = D_1, \delta_2(q_2, a) = D_2$$

The proof follows by induction on the length of the string