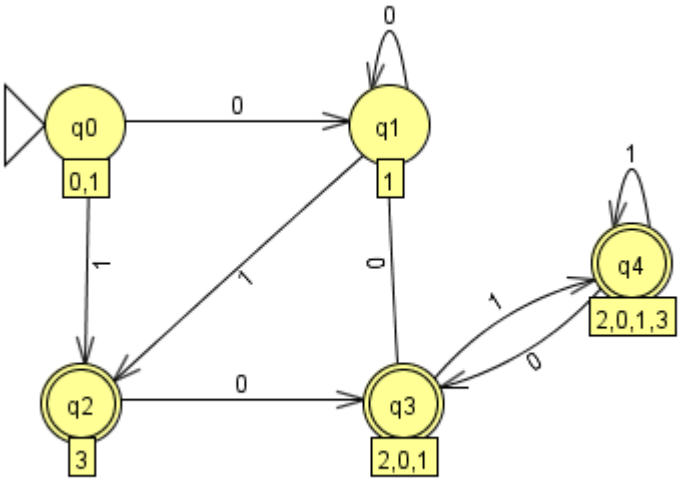
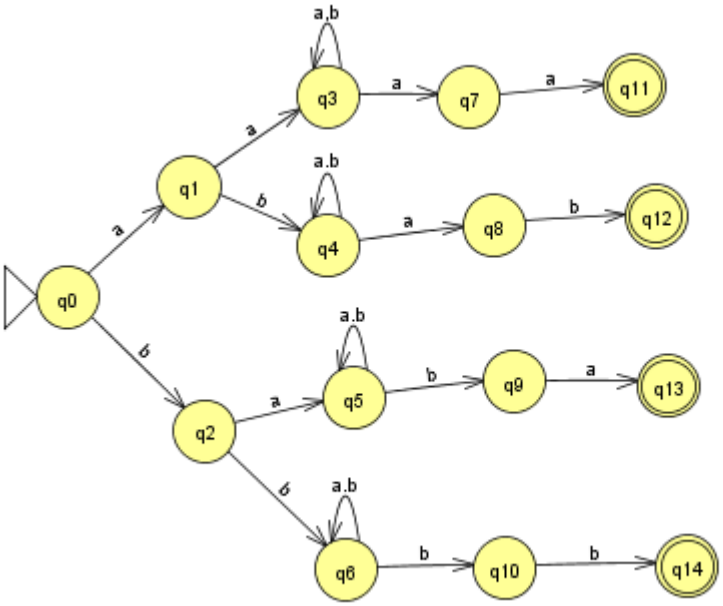
1.



2.

Because an NFA M = $(Q, \Sigma, q_0, \delta, F)$ that accepts L = { vwv : v, w $\in \{a,b\}^*$, $|v| = 2$}



3

If L is regular , NFA M = $\{Q_A, \Sigma_A, q_A, F_A, \delta_A\}$ accept L(M).
Then NFA R = $\{Q_R, \Sigma_R, q_R, F_R, \delta_R\}$ where
$\delta_R = \delta_A{}^R$, $q_R = F_A, F_R = Q_A - F_A$.

Find the w$\in \Sigma_A$q, p $\in$ Q_A, there $\delta_R(q,w) \Leftrightarrow \delta_A(p,w)$

So if L is regular language then $L^R$is a regular

4.

a) L1 = { w : na(w) mod 3 = 1}.

Answer : $b^*a(b^*ab^*ab^*ab^*)^*b^*$

b) L2 = { w : w ends in aa }.

$(a + b)^*aa$

c) L3 = all strings containing no more than three a's.

$b*(a + \lambda)b*(a + \lambda)b*(a + \lambda)b*$

5.

Answer:

("+" + "-" + λ) (1 + 2 + 3 + 4 + 5 + 6 +7 +8 + 9)(0 +1 + 2 + 3 + 4 + 5 + 6 +7 +8 + 9)* (e ("+" + "-")(0 +1 + 2 + 3 + 4 + 5 + 6 +7 +8 + 9) (0 +1 + 2 + 3 + 4 + 5 + 6 +7 +8 + 9) + λ)

6.

Answer:

a)

The regular grammar is $G = V, T, S, P\ where$:

$V = S, A, B$

$T = a, b$

$P = \{S \rightarrow bS|aA, A \rightarrow bB, B \rightarrow bB|\lambda\}$

b)

The regular grammar is $G = V, T, S, P\ where$:

$V = \{S, A, B, C\}$

$T = a, b$

$P = \{S \rightarrow bS\ aA, A \rightarrow bA\ aB\ \lambda, B \rightarrow bB\ aC, C \rightarrow bC|aA\}$