Test + Answers

May 25, 2012

4. Test (4.1 and 4.2) and a new problem (4.3)
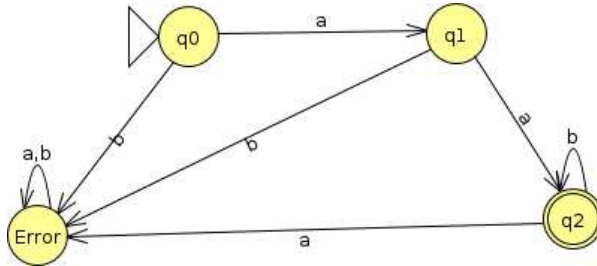
Every item can give you 1 point. Let $\Sigma = \{a, b\}$.

4.1.
1. Let $L_1 = L(a(ab^*))$.

    (a) Write down two words in Σ^* belonging to L and two that do not belong to L.

    Answer. $aa, aabb \in L_1$; $b, ab \notin L_1$.

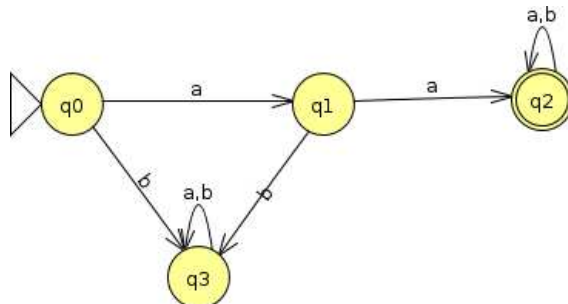   (b) Construct a DFA that accepts L.

    Let M_1 be

    Then $L(M_1) = L_1$.

2. Idem for $L_2 = L(a(ab^*)^*) = L(a((ab^*)^*))$.

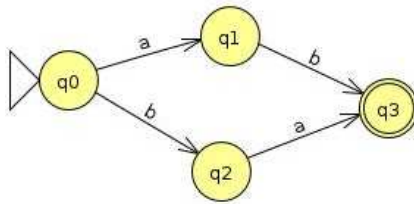   Answer. $aaa, aabab \in L_2$; $b, ab \notin L_2$.

    Let M_2 be

    Then $L(M_2) = L_2$.

4.2.   1. Given is a PFA M_1 by the following table and $q_0 = 0, F = \{3\}$.

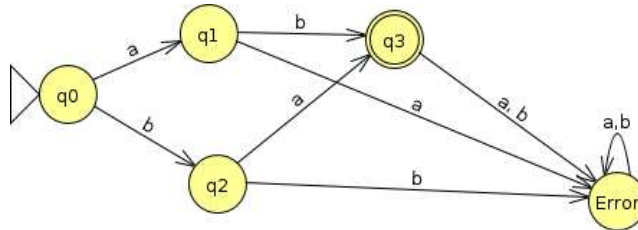| δ	a	b
0	1	2
1		3
2	3	
3		

(a) Make a drawing of M_1.

This is

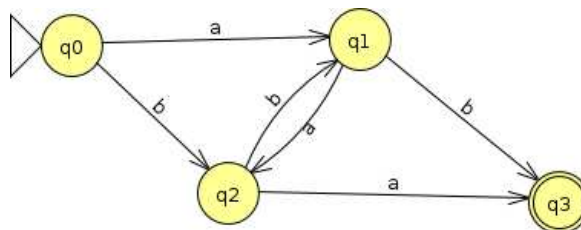Give a regular expression for $L(M_1)$.

$L(ab \cup ba) = L(M_1)$.

(b) Change M_1 into the DFA M_1' accepting the same language.

2. Given is the PFA M_2 by the following table and $q_0 = 0, F = \{3\}$.

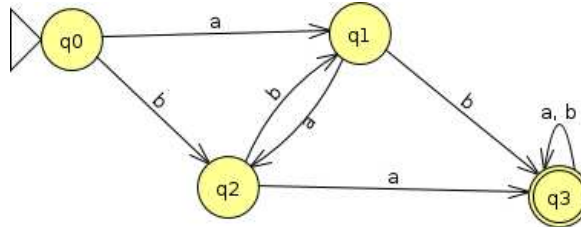| δ	a	b
0	1	2
1	2	3
2	3	1
3		

(a) Make a drawing of M_2.

Give a regular expression for $L(M_2)$.

Answer. $a(ab)^*b \cup b(ba)^*a \cup aa(ab)^*a \cup bb(ab)^*b$.
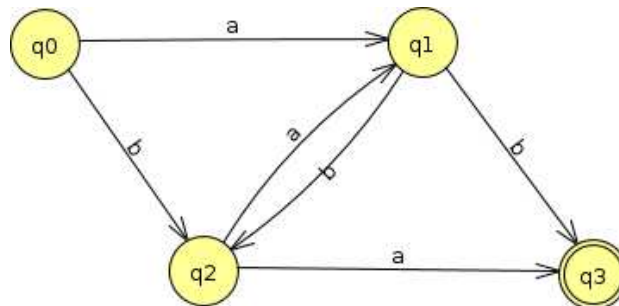
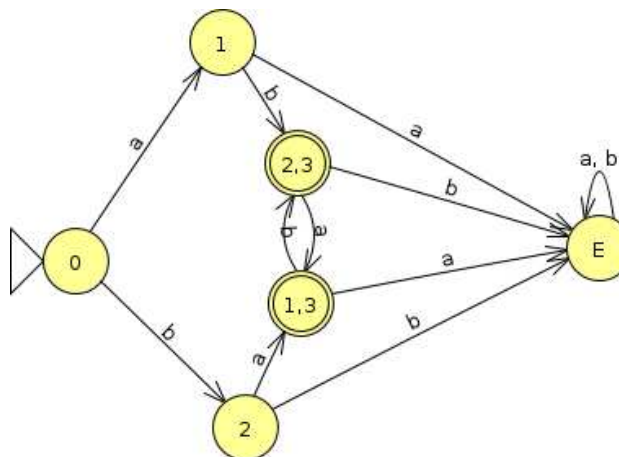(b) Change M_2 into the DFA M_2' accepting the same language.

3. Given is the NFA M_3 by the following table and $q_0 = 0, F = \{3\}$.

δ	a	b
0	1	2
1		2,3
2	1,3	
3		

(a) Make a drawing of M_3.

(b) Change M_3 into the DFA M_3' accepting the same language.

4.3.   Show that the $L(M_1), L(M_2), L(M_3)$ all satisfy the pumping lemma.