Concordia University
Department of Computer Science and Software Engineering
COMP 335: Introduction to Theoretical Computer Science
Fall 2017
A Solution to Assignment 1
Evaluation: 30 pts
(3% of your final grade)
Due date and time: Thursday September 28th 2017 at 23:59

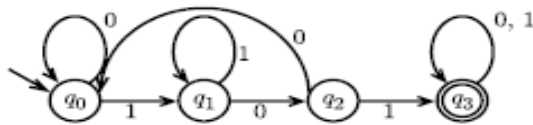<u>**Answer#1**</u>

(a) Accepts the language $(1+01)^*$, that is every string over $\{0,1\}$ in which every 0, if any, is followed by a 1.
(b) Accepts strings in which no a appears or aa appears exactly once as a substring.
(c) Accepts every string that starts and ends with the same symbol.
(d) Accepts every string in which every run of a's, if any, is of length 2 or more.
(e) Accepts $\lambda + (a+b)(ba+bb)^*(\lambda+b) + a(ba+aa)^*(\lambda+a+b)$

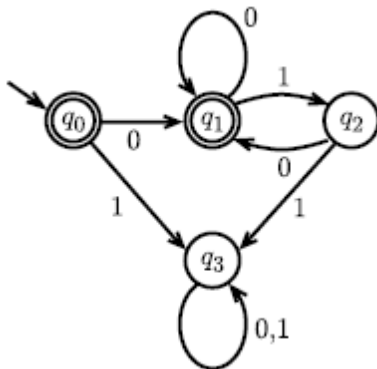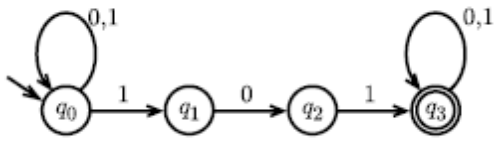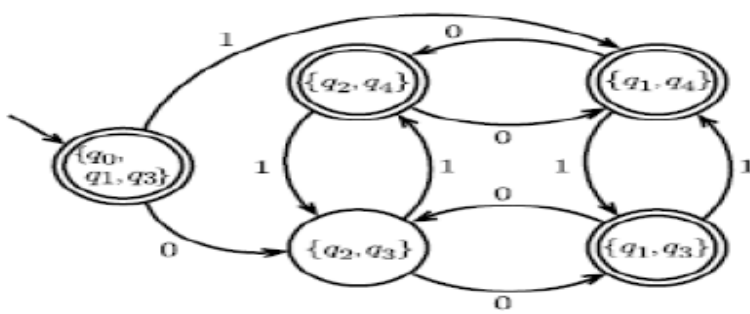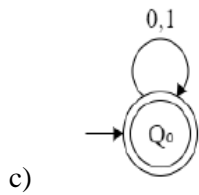<u>**Answer#2**</u>
a)

(1)

(2)

b)

.
Answer#3

a) Strings that have an even number of 0's or an odd number of 1's .

b)

c)

Answer#4

$M_1 = (\{q_1, q_2, q_3\}, \{a,b\}, \delta_1, q_1, \{q_2\})$.
$M_2 = (\{q_1, q_2, q_3, q_4\}, \{a,b\}, \delta_2, q_1, \{q_1, q_4\})$.

The transition tables are:

δ_1	a	b
q_1	q_2	q_1
q_2	q_3	q_3
q_3	q_2	q_1

Initial state :q_1 :
Final state :q_2

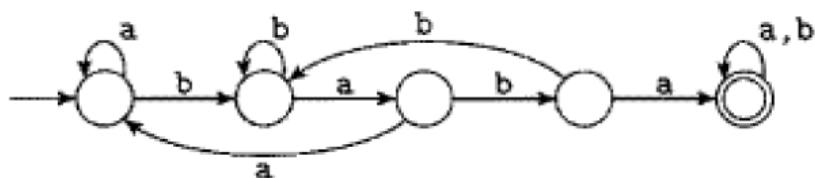| δ_2	a	b
q_1	q_1	q_2
q_2	q_3	q_4
q_3	q_2	q_1
q_4	q_3	q_4

Initial state :q_1 :
Final state :q_4

Answer#5
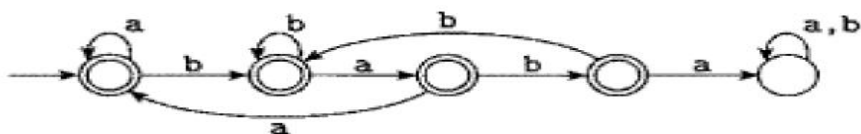
a) The left-hand DFA recognizes {w | w contains ab}. The right-hand DFA recognizes its complements, {w | w doesn't contain ab}.
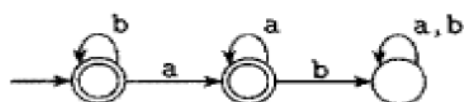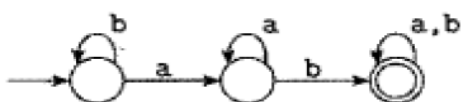
b) This DFA recognizes {w | w contains baba}.

This DFA recognizes {w | w does not contains baba}.
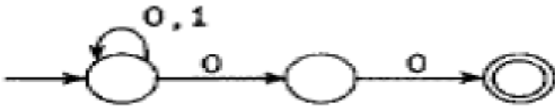
Answer#6

a)

b)