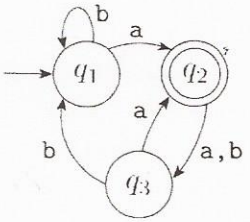
Erik Sundblad

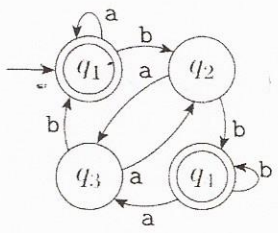
Introduction to Computation Theory
Quiz 3 – In-class (20 pts)

Answer all questions

1. [10 pts] The following are the state diagrams of two DFAs, M_1 and M_2. Answer the following questions about each of these machines:



M_1



M_2

a. [1 pts] What is the start state?

M1 -> Starts at q1

M2 -> Starts at q1

b. [3 pts] What is the set of accept states?

M1 -> {q2}

M2-> {q1, q4}

c. [1 pts] What sequence of states does the machine go through on input aabb?

M1: q1->q2, q2->q3, q3->q1, q1->q1

M2: q1->q1, q1->q1, q1->q2, q2->q4

d. [1 pts] Does the machine accept the string aabb?

M1: No, q1 is not an accept state.

M2: Yes, q4 is an accept state.

e. [1 pts] Does the machine accept the string ε?

M1: No, could not get to accept state from empty string

M2: Yes, can get to an accept state from empty string

f. [2 pts] Give the formal description of the machines M_1 and M_2

M1

$Q = \{q_1, q_2, q_3\}$

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

$q_0 = q_1$

$F = \{q_2\}$

$\delta_1 =$

	a	b
q_1	q_2	q_1
q_2	q_3	q_3
q_3	q_2	q_1

M2

$Q = \{q_1, q_2, q_3, q_4\}$

$\Sigma = \{a, b, \varepsilon\}$

$q_0 = q_1$

$F = \{q_1, q_4\}$

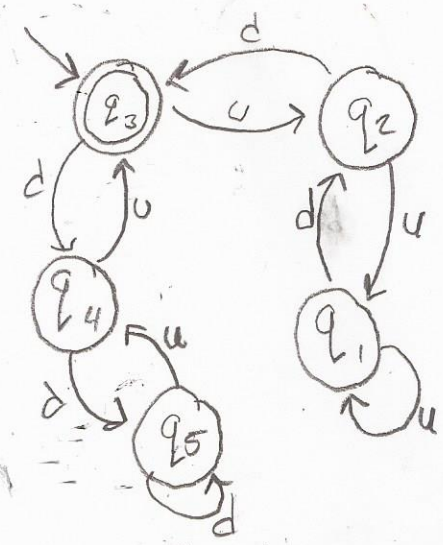
$\delta_2 =$

	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

2. [6 pts] The formal description of a DFA *M* is ({q1, q2, q3, q4, q5}, {u, d}, δ, q3, {q3}), where δ is given by the following table. Give the state diagram of this machine.

	u	d
q_1	q_1	q_2
q_2	q_1	q_3
q_3	q_2	q_4
q_4	q_3	q_5
q_5	q_4	q_5

M;



1. [5 pts] Give state diagrams of DFA recognizing the following language {w| w contains an even number of 0s, or contains exactly two 1s}, the alphabet is {0,1}

00010
11000

DFA