Test # 2

March 29, 2018

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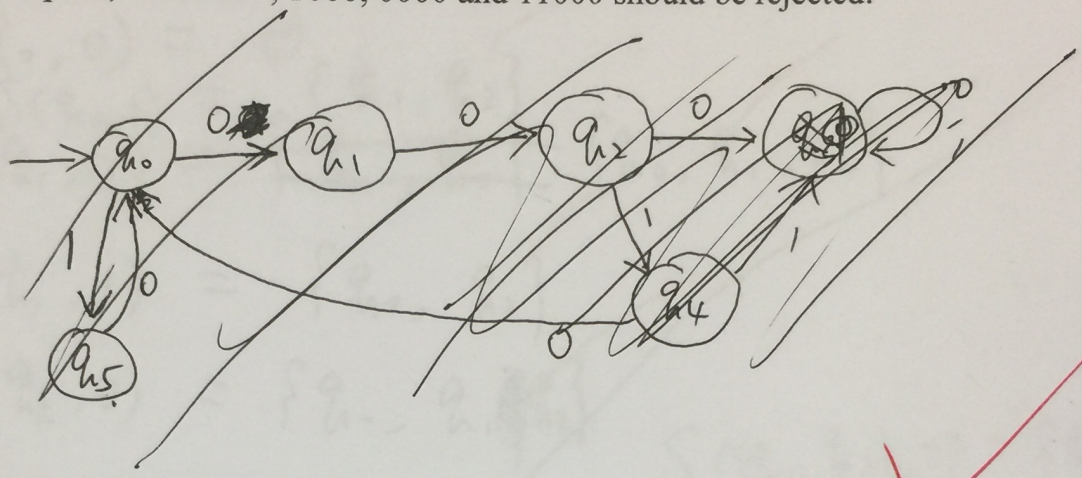
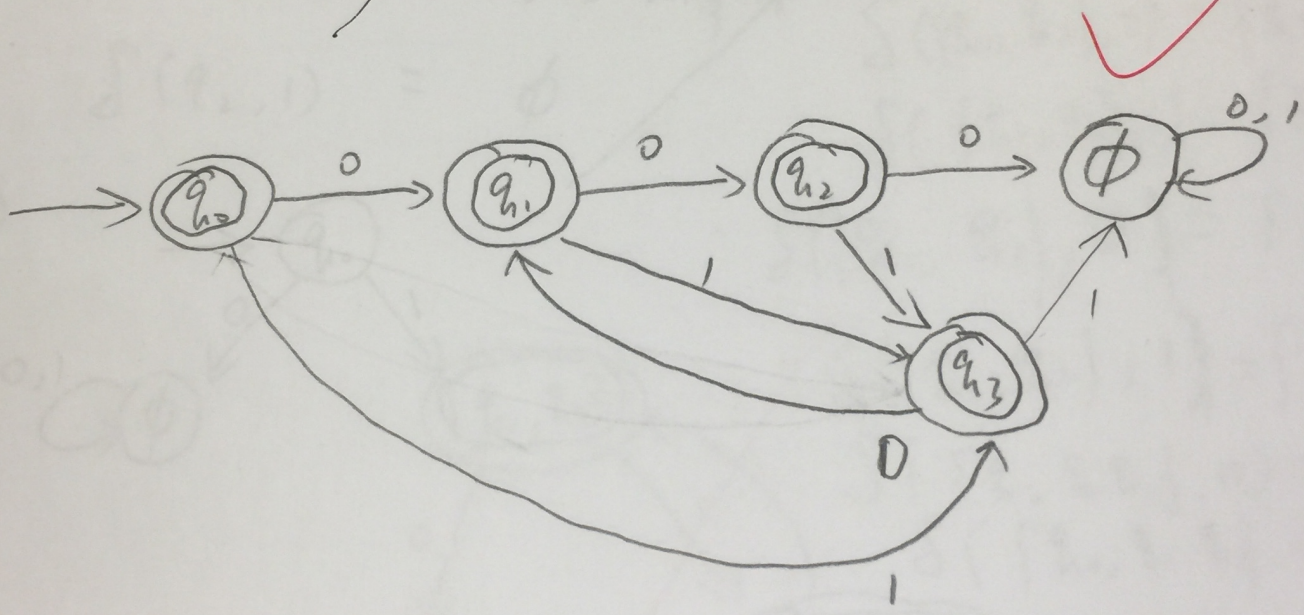
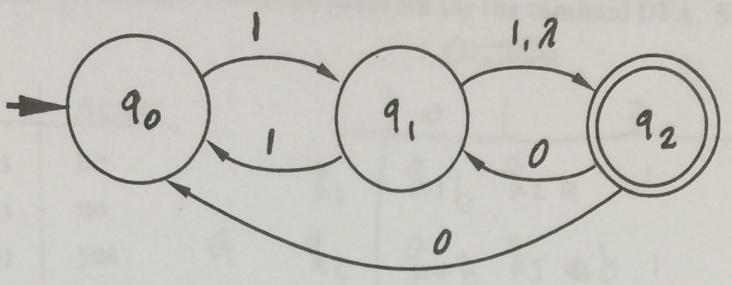
25 pts 1. Find a deterministic finite acceptor that accepts all strings on {0, 1}, except those containing substrings 11 or 000. For example, λ, 0, 1, 00 and 0101 should be accepted; while 011, 1000, 0000 and 11000 should be rejected.





2. For the following non-deterministic finite acceptor:



0, λ = 0.
λ · 0 · λ = 0.

15 pts. (a) find $\delta(q_0, 0)$, $\delta(q_0, 1)$, $\delta(q_1, 0)$, $\delta(q_1, 1)$, $\delta(q_2, 0)$ and $\delta(q_2, 1)$,

10 pts. (b) convert it into a deterministic finite acceptor. **Show your work.**

a) $\delta(q_0, 0) = \phi$

$\delta(q_0, 1) = \{q_1, q_2\}$

$\delta(q_1, 0) = \{q_1, q_0\}$ $\{q_0, q_1, q_2\}$

$\delta(q_1, 1) = \{q_0, q_2\}$

$\delta(q_2, 0) = \{q_0, q_1, q_2\}$

$\delta(q_2, 1) = \phi$

$\delta(\{q_0, q_2\}, 0) = \{q_0, q_1\}$

$\delta(\{q_0, q_2\}, 1) = \{q_1, q_2\}$.

$\delta(\{q_1, q_2\}, 0) = \{q_0, q_1, q_2\}$

$\delta(\{q_1, q_2\}, 1) = \{q_0, q_2\}$.

$\delta(\{q_0, q_1, q_2\}, 0) = \{q_0, q_1, q_2\}$

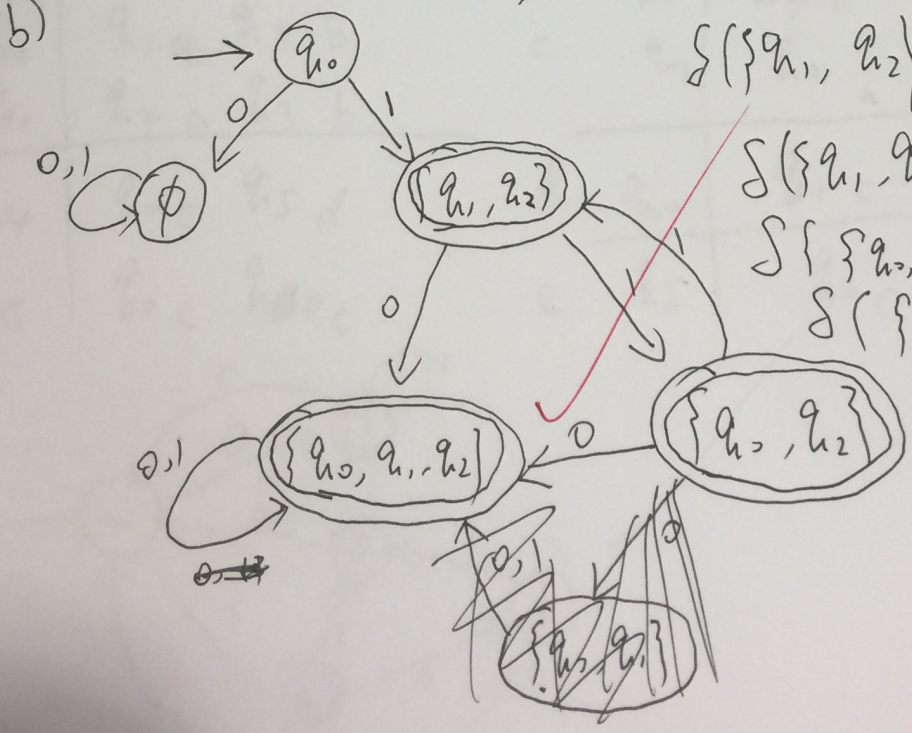
$\delta(\{q_0, q_1, q_2\}, 1) = \{q_0, q_1, q_2$

$\delta(\{q_0, q_1\}, 0) = \{q_0$

$\delta(\{q_0, q_1\}, 1$

$\{q_0, q_1$

b)



20 pts. 3. Minimize the following deterministic finite acceptor using the k-equivalence algorithm. State q_0 is initial. Show **the diagram for the minimal DFA. Show your work.**

	0	1	Accept
q_0	q_2	q_3	no
q_1	q_2	q_3	no
q_2	q_1	q_2	yes
q_3	q_4	q_5	yes
q_4	q_0	q_5	no
q_5	q_0	q_0	no

check:

$[q_2, q_3]$ $[q_0, q_1, q_4, q_5]$

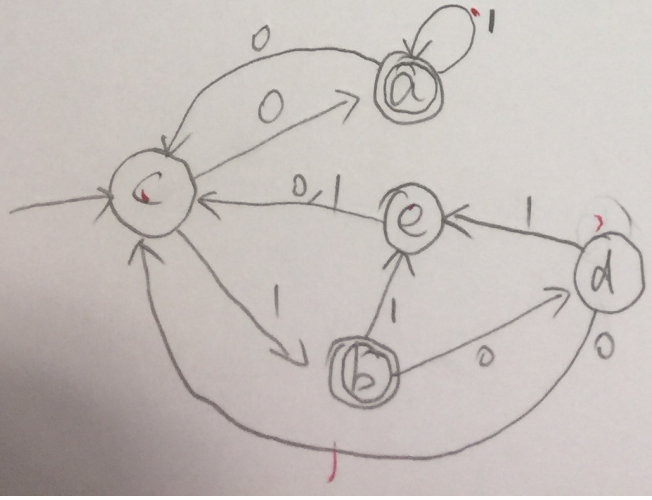
$[q_2][q_3]$ $[q_0, q_1]$ $[q_4, q_5]$

$[q_2][q_3]$ $[q_0, q_1]$ $[q_4][q_5]$

		0	1	F
a	q_2	q_1 b	q_2 a	1
	q_3	q_4 b	q_5 b	1
b	q_0	q_2 a	q_3 a	0
	q_1	q_2 a	q_3 a	0
	q_4	q_0 b	q_5 b	0
	q_5	q_0 b	q_0 b	0

		0	1
a	q_2	q_1 c	q_2 a
b	q_3	q_4 d	q_5 d
c	q_0	q_2 a	q_3 b
	q_1	q_2 a	q_3 b
d	q_4	q_0 c	q_5 d
	q_5	q_0 c	q_0 c

		0	1
a	q_2	q_1 c	q_2 a
b	q_3	q_4 d	q_5 e
c	q_0	q_2 a	q_3 b
	q_1	q_2 a	q_3 b
d	q_4	q_0 c	q_5 e
e	q_5	q_0 c	q_0 c



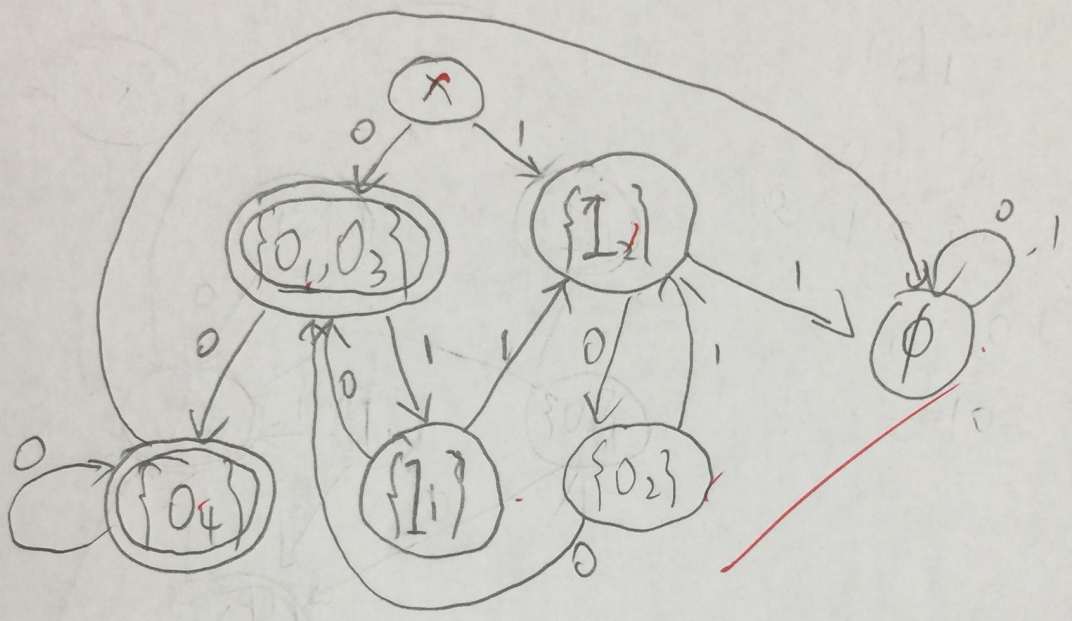
DFA

0 pts. 4. Find the deterministic finite acceptor, using McNaughton-Yamada algorithm, that accepts the language over $\Sigma = \{0, 1\}$ defined by the following regular expression

$$(01 + 10)^*(0(0^*)).$$

Show your work.

$r = (0_1 1_1 + 1_2 0_2)^* (0_3 (0_4^*))$



0 1 0 1 0 1 0_3

1 0 1 0 1 0 0_3.

② 0 1 0 0 0

1 0 0 0 0

③ 0 0 0 0

④