

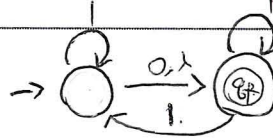
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[Automata 2012 - 2 Homework]

[Automata Homework #3]

Example 3.6] Find a regular expression for the language

$$L = \{w \in \{0,1\}^* : w \text{ has no pair of consecutive zeros}\}$$



$$(0+1)^*(0+1)^*$$

$$(0+1)^*(0+1)^*$$

연속적으로 0이 나오면 안되므로 string에는 00, 000, ... 이 포함되면 안된다.
 그래서 $(0+1)^*$ 는 00과 같은 연속적인 0이 연속도 포함하므로 $(0+1)^*$ 나 $(10+1)^*$ 로 바꿔준다. 그러면 0이 연속하는 일을 막는다. 하지만 string 0, 10 그리고 01은 포함 못하므로 $(0+1)^*$ 에는 $(0+1)$ 을 오른쪽에 $(10+1)^*$ 에는 $(0+1)$ 을 왼쪽에 concatenate한

Exercises 3.1.1] Find all strings in $L((a+b)^*b(a+ab)^*)$ of length less than four.

length=1 \rightarrow string: b (하나만) $A, B = \{a\}$

length=2 \rightarrow string: ab, bb, ba (A에서 하나 {a, b}, B에서 하나 {a})

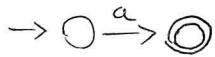
length=3 \rightarrow string: 3 경우! \rightarrow A에서 둘 B에서 둘 A 하나 B하나
 $aab, abb, baa, bab, aba, bba$
 (중복 bab)

Exercises 3.2.1] Use the construction in Theorem 3.1 to find an nfa that accepts the language

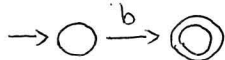
$$L(ab^*aa + bba^*ab)$$

1. simple expression. a, b, a^*, b^* 2. Assume r_1, r_2

(a)



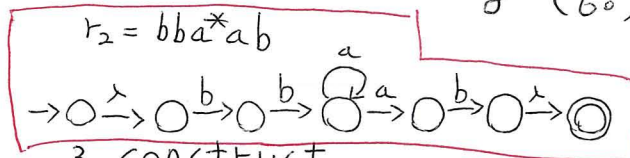
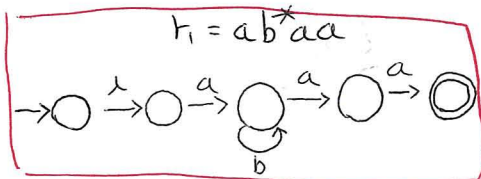
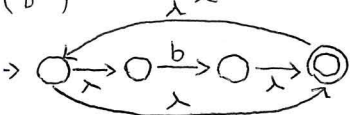
(b)



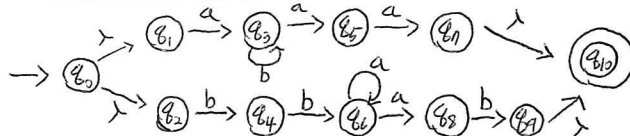
(a*)



(b*)



3. construct



$$M = (Q, \Sigma, \delta, q_0, F)$$

$$Q = \{q_0, q_1, q_2, q_3, q_4, q_5, q_6, q_7, q_8, q_9, q_{10}\}$$

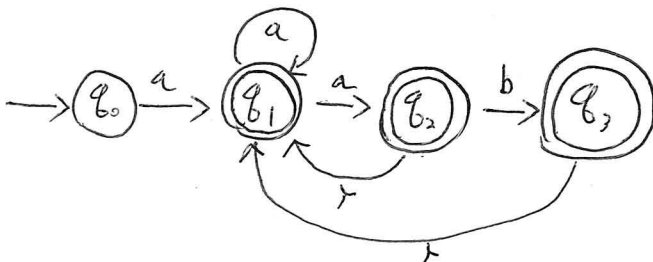
$$F = \{q_{10}\}, \Sigma = \{a, b, \lambda\}$$

$$\delta^*(q_0, ab^*aa) = \{q_{10}\}$$

$$\delta^*(q_0, bba^*ab) = \{q_{10}\}$$

Exercises 3.3.2] Find a regular grammar that generates the language $L(aa^*(ab+a)^*)$

Expresion by NFA (NFA를 표현되는 것은 regular grammar로 표현가능!)



$$G(V, \Sigma, S, P)$$

$$P: q_0 \rightarrow aq_1$$

$$V = \{q_0, q_1, q_2, q_3\}$$

$$q_1 \rightarrow aq_1 \mid aq_2 \mid \lambda$$

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

$$q_2 \rightarrow q_1 \mid bq_3 \mid \lambda$$

$$S = q_0$$

$$q_3 \rightarrow q_1 \mid \lambda$$

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[Automata 2012 - 2 Homework]

[Automata Homework #3]

Example 3.6] Find a regular expression for the language

$$L = \{w \in \{0,1\}^* : w \text{ has no pair of consecutive zeros}\}$$

- i) $1^*(01)^*1^*(0+\lambda)$: 이 경우 011이 같은 경우 X. **0.c**
 ii) $1^*(01)^*1^*(01)^*(0+\lambda)$: 이 경우도 0111이 될까? **0.c**
 iii) $(1^*(01)^*)^*(0+\lambda)$: 이 경우는 마지막에 1111 연속이 불가
 iv) $(1^*(01)^*)^*1^*(0+\lambda)$: 0으로 시작하는 경우, 0으로 끝나는 경우. '01'의 반복, '01' 반복사이 1, 마지막 1 연속 등 OK.

$$r = (1^*(01)^*)^*1^*(0+\lambda)$$

1110111이 된다 안됨?

Exercises 3.1.1] Find all strings in $L((a+b)^*b(a+ab)^*)$ of length less than four.

x, y, z.

0, 1, 0 : b

1, 1, 0 : ab, bb

1, 1, 1 : aba, bba (abab, bbab는 조건 less than four 위반)

0, 1, 1 : ba, bab

0, 1, 2 : baa (baab, baba, babab는 조건 위반)

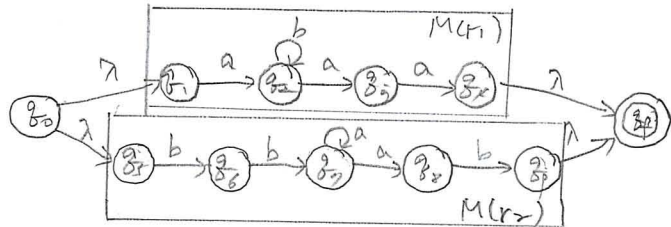
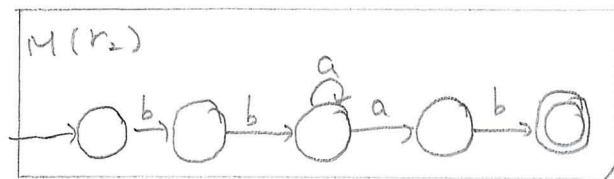
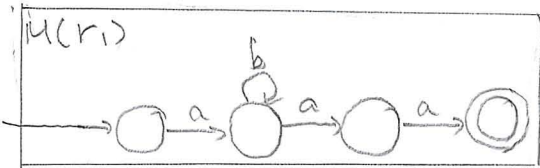
2, 1, 0 : aab, abb, bab, bbb.

$\therefore W = \{b, ab, bb, ba, aba, bba, bab, baa, aab, abb, bab, bbb\}$. **0.c**

Exercises 3.2.1] Use the construction in Theorem 3.1 to find an nfa that accepts the language

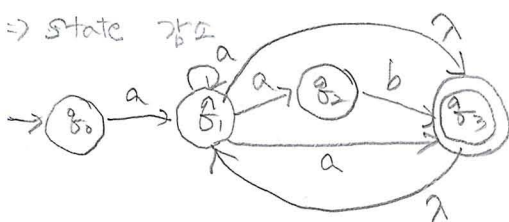
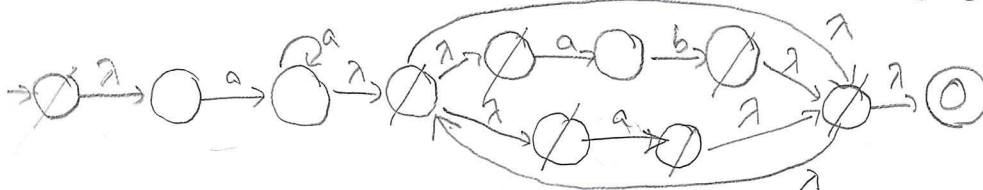
$$L(ab^*aa + bba^*ab)$$

let) $r_1 = ab^*aa$, $r_2 = bba^*ab$.



$\therefore M = (\{q_0, q_1, q_2, q_3, q_4, q_5, q_6, q_7, q_8, q_9\}, \{a, b\}, q_0, q_9, \{q_1, q_2, q_3, q_4, q_5, q_6, q_7, q_8\})$.

Exercises 3.3.2] Find a regular grammar that generates the language $L(aa^*(ab+a)^*)$



$$\therefore G = (\{q_0, q_1, q_2, q_3\}, \{a, b\}, q_0, P)$$

$$P: q_0 \rightarrow aq_1$$

$$q_1 \rightarrow aq_1 \mid aq_2 \mid aq_3$$

$$q_2 \rightarrow bq_3$$

$$q_3 \rightarrow q_1 \mid \lambda$$