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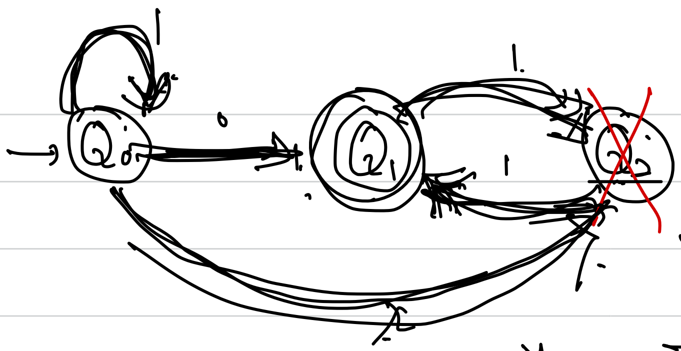


nfa

{ ◎ , ◎ }

(1) 3개의 string (011 111 10 0 1 110 11) 7개

(2). accept 되는 것

① $1^*0(11)^*$ ✗

② $[1^*(1+0)]11^*$ ✗

③ $\{1^n0(11)^m \mid n, m \geq 0\}$ ✗
$\cup \{1^n(11)^m \mid n \geq 1, m \geq 0\}$ ○

④ $1^*(1+0)[11]^*$ ○

⑤ $\{1^n0(11)^m \mid n, m \geq 0\}$ ✗

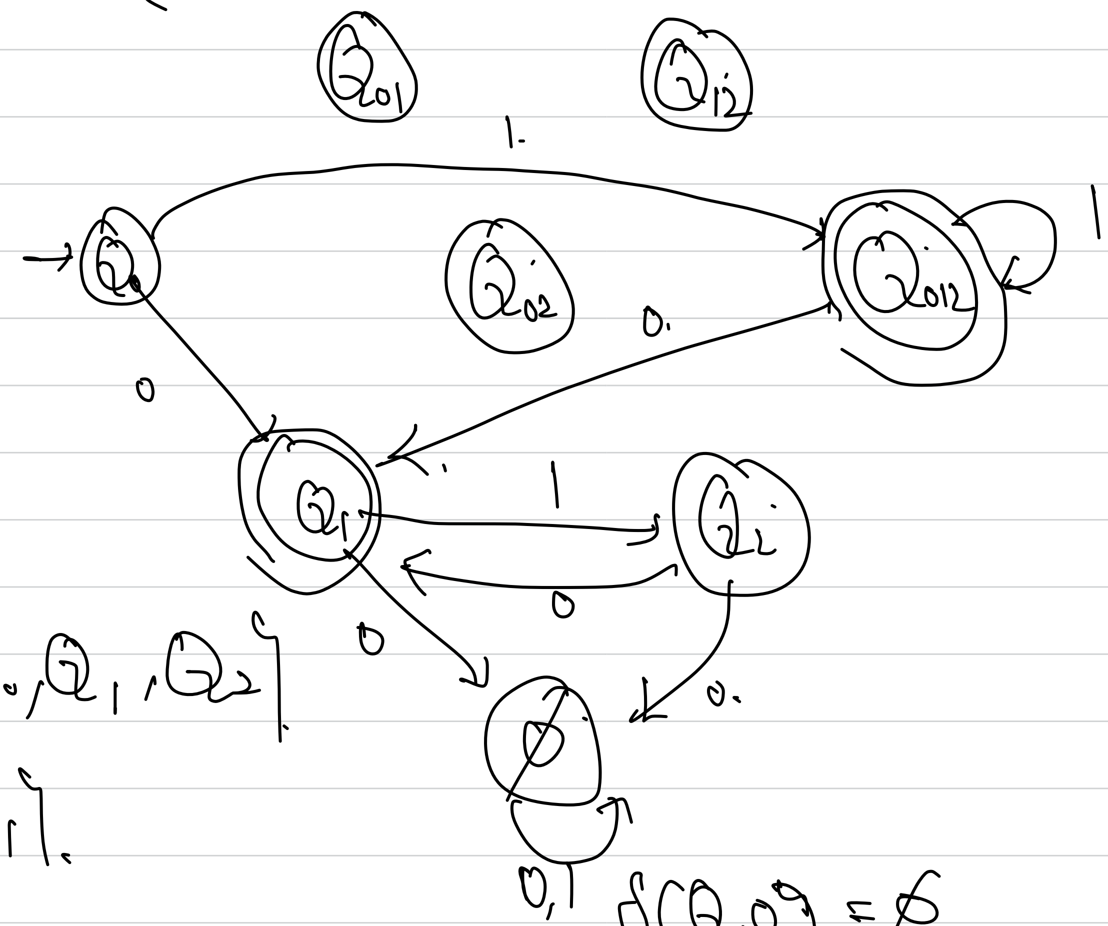
⑥ $1^*0(11)^* + 11^*$

(3) M에 대응하는 Right-linear grammar 는 $G = (\{Q_0, Q_1, Q_2\}, \{0, 1\}, Q_0, P)$

$Q_0 \to 1Q_0 \mid 0Q_1 \mid Q_2$. $Q_2 \to 1Q_1$

$Q_1 \to 1Q_2 \mid \lambda$

(4) NFA를 DFA로



$\delta(Q_0, 1) = \{Q_0, Q_1, Q_2\}$

$\delta(Q_0, 0) = \{Q_1\}$

$\delta(Q_1, 0) = \emptyset$

$\delta(Q_{012}, 1)$

$\delta(Q_1, 1)$

$= \delta(Q_0, 1) \cup \delta(Q_1, 1) \cup \delta(Q_2, 1)$

$= \{Q_2\}$

$\delta(Q_2, 0) = \emptyset$

$\delta(Q_{012}, 0)$

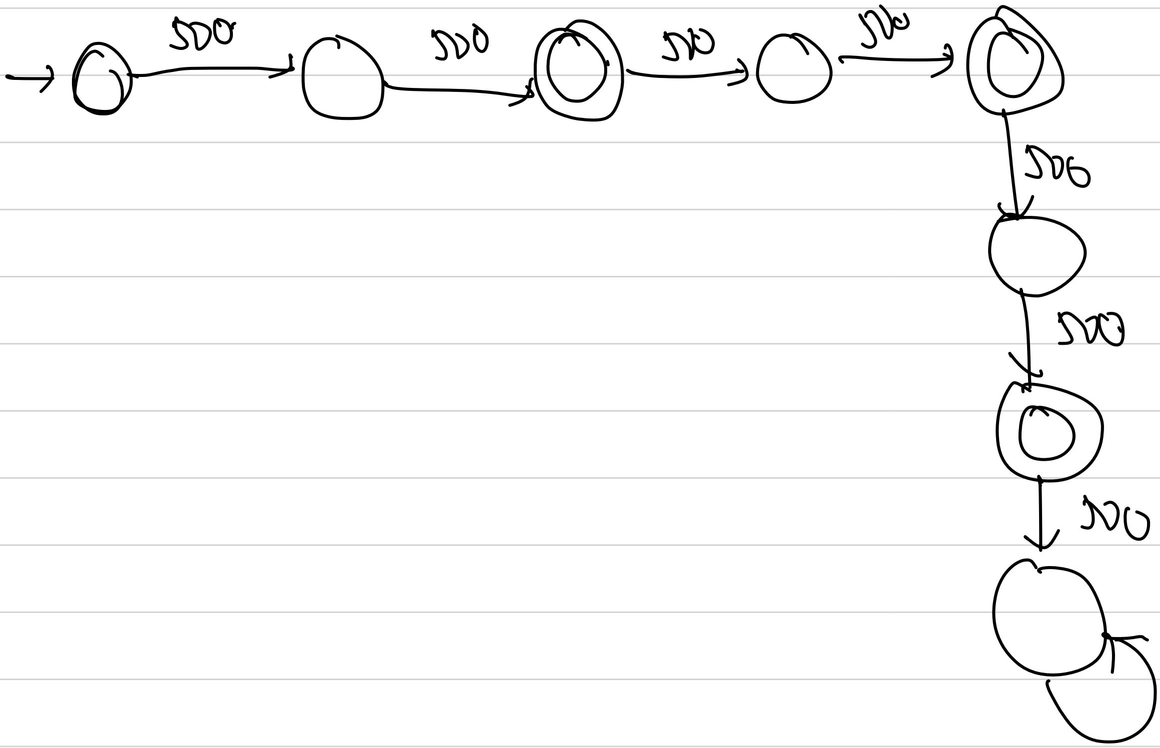
$= \delta(Q_0, 0) \cup \delta(Q_1, 0) \cup \delta(Q_2, 0)$

$\delta(Q_2, 1) = \{Q_1\}$

$\{Q_1\}$ $\quad \emptyset \quad$ $\{\emptyset\}$

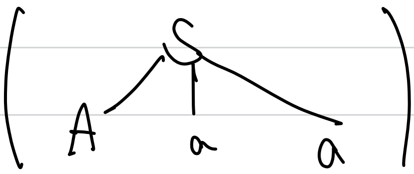
2) 정해진 금액 → accept DFA를 만들 수 있을까.

가능함.



#3. grammar $G=(\{S,A,B\},\{a,b\},S,P)$.

$S \rightarrow Aaa$, $A \rightarrow B \mid Bb \mid Aaa$, $B \rightarrow bB \mid a$.



(1) grammar G는 regular 한가?

X.

(2) G는 ambiguous 한가? 판단하고 이유를 쓰시오.

FA → unambiguous 하다.

(3). G에 의해 생성되는 language L(G)를 찾는다.

$$L(G) = \{ b^n (aaa) a^{2m} \mid n \geq 0, m \geq 0 \} \cup \{ b^n (abaa) a^{2m} \mid n \geq 0, m \geq 0 \}.$$

(4). L(G)는 regular 인가?

↳ dfa.

Bbaaaa Baaaa bBbaaa ⇒ bBaaaa ⇒ bbBaaaa

$S \Rightarrow Aaa \Rightarrow Baa \Rightarrow bBaa \Rightarrow bbBaa \Rightarrow bbbBaa \Rightarrow bbbaaa$

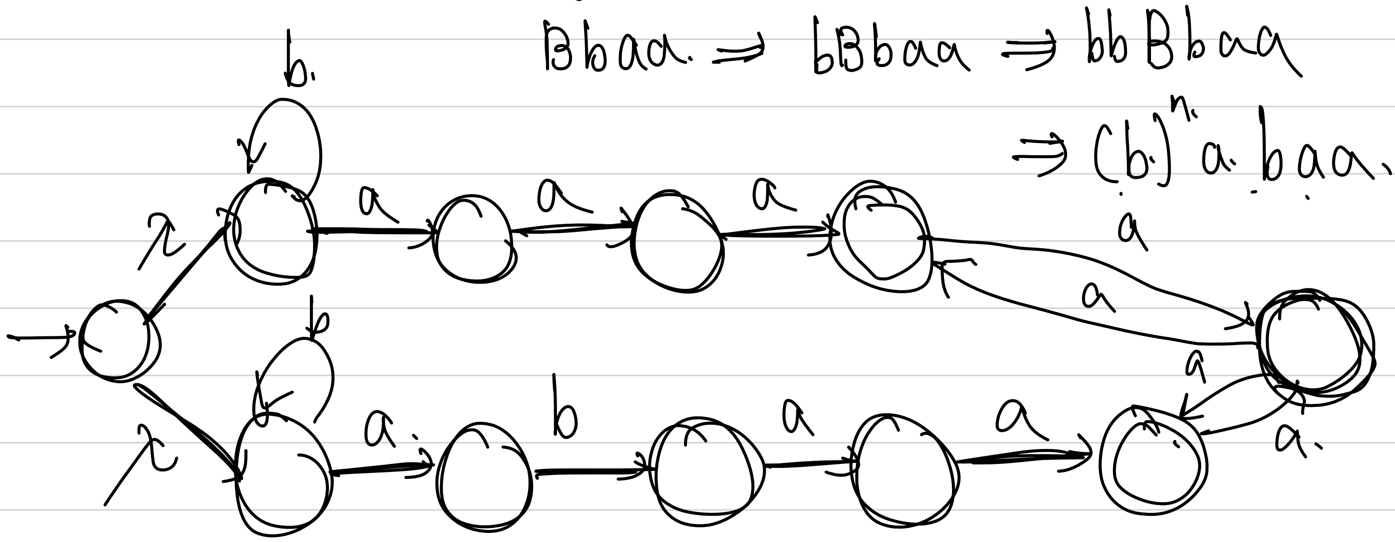
Aaaaa ⇒ Baaaa aaaaa bBaaaa

Bbaa ⇒ bBbaa ⇒ bbBbaa ⇒ bbabaa

babaaaa

Bbaa ⇒ bBbaa ⇒ bbBbaa

⇒ $(b)^n a\,baa$

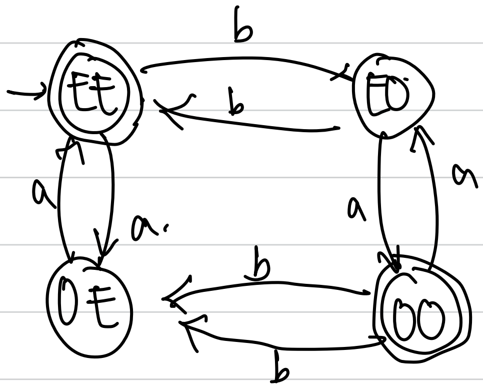


\#.

$L = \{ w \in \{a, b\}^* \mid \underline{n_a(w) + n_b(w)} \text{ is even} \}$.

E E

O O



DFA → Regular.

(2) $L = \{ a^n b a^m \mid n \neq m \}$.

assume. L is regular

$\forall m > 0$. choose. $w = a^m b a^{m+1}$ ($|w| \geq m$).

consider all possible decomposition. of. $w = xyz$ ($|xy| \leq m$, $|y| \geq 1$).

y has the form of a^k ($1 \leq k \leq m$).

$i = 2$. $w_2 = xy^2z$. $a^{m+k} b a^{m+1} \notin L$. $\therefore$ L is not regular

$1 \leq k \leq m$

#.

(1) L_1과 L_2가 모두 regular X. $L_1 \cup L_2$도 regular가 아니다

$L_1 = \{a^n b^n \mid n \geq 0\}$. $L_1 \cup L_2 = L(a^* b^*)$

$L_2 = \{a^n b^m \mid n \neq m\}$.

~~부정~~ 반례

(2) 임의의 homomorphism h와 regular language L_1, L_2에 대해

$h(L_1 \cap L_2) = h(L_1) \cap h(L_2)$ 가 성립한다.

<반례>. $L_1 = \{abaa\}$ $L_2 = \{aaaa\}$. $h(a) = a$, $h(b) = a$.

$h(L_1 \cap L_2) = \emptyset$

$h(L_1) = \{aaaa\} \cap \{aaaa\} = \{aaaa\}$

false

(3). L_1과 L_2가 regular 일 때

$L_3 = \{x \mid xy \in L_2 L_1 \text{ for some } y \in L_1\}$에 대하여

$L_3 = L_2$ 성립하는 알고리즘이

존재 한다.

/ 연산은 regular language에 닫혀 있으므로 $(L_2L_1)/L_1$

regular language가 된다.

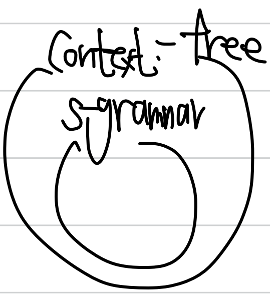
(4). 어떤 grammar (G가 S-grammar) 일 때 L(G)는 unambiguous 이고 context free 이다.

s-grammar 는 $S \rightarrow ax$

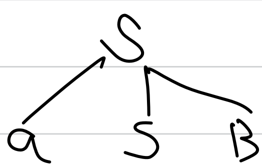
$(S \in V,\ a \in T,\ x \in V^*)$

context-free grammar 는 $S \rightarrow x$

$(S \in V,\ x \in (V \cup T)^*)$



이다 유의. s-grammar 의 특징



$S \rightarrow aSB$

$B \rightarrow$

$L = \{ w \in \{a,b\}^* \mid |n_a(w) - n_b(w)| \leq 1 \}$ 은 context free 이다

$n_a(w) = n_b(w)$

ab
aab

S - grammar

$S \to xV$

$x \in T$
$V \in V^*$

$S \to aSb \mid A \mid B \mid \lambda$

$A \to a$
$B \to b$

$S \Rightarrow aSb \Rightarrow aaSbb \Rightarrow aaabb$