

학번	201105002	학년	1	학인	2
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Exercises 7.1.3] Construct an npda that accepts the regular language  $L(aaa^*b)$

good!  $aaa^*b$  를 생성하는 GNF의 production 찾기!  
 $S \rightarrow aA$  npda를 바르 만들기 쉽듯 경우,  
 $A \rightarrow aB$  grammar를 찾아서 바꾸는 것도 좋은 방법임.  
 $B \rightarrow aB \mid b$

① First & Last step:  $\begin{cases} \text{first: } \delta(q_0, \lambda, z) = \{(q_1, Sz)\} \\ \text{last: } \delta(q_1, \lambda, z) = \{(q_f, z)\} \end{cases}$   
 ② other transitions:  
 $S \rightarrow aA : \delta(q_1, a, S) = \{(q_1, A)\}$   
 $A \rightarrow aB : \delta(q_1, a, A) = \{(q_1, B)\}$   
 $B \rightarrow aB : \delta(q_1, a, B) = \{(q_1, B)\}$   
 $B \rightarrow b : \delta(q_1, b, B) = \{(q_1, \lambda)\}$

$Q = \{q_0, q_1, q_f\}, \Sigma = \{a, b\},$   
 $\Gamma = \{S, A, B\}, \delta, q_0, z, F = \{q_f\}$   
 $\Rightarrow \therefore M = (\{q_0, q_1, q_f\}, \{a, b\}, \{S, A, B\}, \delta, q_0, z, \{q_f\})$

Exercises 7.2.4] Construct an npda that accepts the language generated by the grammar  $S \rightarrow aSSS \mid ab$

$S \rightarrow aSSS \mid ab$  error!  $S \rightarrow ab$ 를  $S \rightarrow aB, B \rightarrow b$ 로 변경!  
 good! GNF로 바꾸는 것을 잊지말것!

$S \rightarrow aSSS \mid aB$   
 $B \rightarrow b$

① First & Last step:  $\begin{cases} \text{first: } \delta(q_0, \lambda, z) = \{(q_1, Sz)\} \\ \text{last: } \delta(q_1, \lambda, z) = \{(q_f, z)\} \end{cases}$   
 ② other transitions:  
 $S \rightarrow aSSS : \delta(q_1, a, S) = \{(q_1, SSS)\}$   
 $S \rightarrow aB : \delta(q_1, a, S) = \{(q_1, B)\}$   
 $B \rightarrow b : \delta(q_1, b, B) = \{(q_1, \lambda)\}$

$Q = \{q_0, q_1, q_f\}, \Sigma = \{a, b\}, \Gamma = \{S, A, B\}, \delta, q_0, z, F = \{q_f\}$

$\Rightarrow \therefore M = (\{q_0, q_1, q_f\}, \{a, b\}, \{S, A, B\}, \delta, q_0, z, \{q_f\})$

Exercises 7.3.3] Is the language  $L = \{a^n b^n : n \geq 1\} \cup \{b\}$ ?

$L$ 을 generate 하는 G 찾기:  $\begin{cases} S \rightarrow aAb \mid b \mid aB \\ A \rightarrow aAb \mid aB \end{cases}$  GNF

① first & last step:  $\begin{cases} \text{first: } \delta(q_0, \lambda, z) = \{(q_1, Sz)\} \\ \text{last: } \delta(q_1, \lambda, z) = \{(q_f, z)\} \end{cases}$

② other transitions:  
 $S \rightarrow aAB : \delta(q_1, a, S) = \{(q_1, AB)\}$   
 $S \rightarrow aB : \delta(q_1, a, S) = \{(q_1, B)\}$   
 $S \rightarrow b : \delta(q_1, b, S) = \{(q_1, \lambda)\}$   
 $A \rightarrow aAB : \delta(q_1, a, A) = \{(q_1, AB)\}$   
 $A \rightarrow aB : \delta(q_1, a, A) = \{(q_1, B)\}$   
 $B \rightarrow b : \delta(q_1, b, B) = \{(q_1, \lambda)\}$

non deterministic  
이므로  
deterministic DPDA는  
아님.

이 경우는 a, b 갯수가 같고 같지 않은 것들은 잘 못된  
판별.

$\begin{cases} S \rightarrow aAB \mid b \mid aB \\ A \rightarrow aAB \mid aB \\ B \rightarrow b \end{cases}$  문법은  
맞음.

$Q = \{q_0, q_1, q_f\}, \Sigma = \{a, b\},$   
 $\Gamma = \{S, A, B\}, \delta, q_0, z, F = \{q_f\}$

$\Rightarrow \therefore M = (\{q_0, q_1, q_f\}, \{a, b\}, \{S, A, B\}, \delta, q_0, z, \{q_f\})$

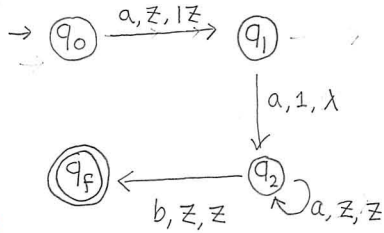
[Automata 2012 - 2 Homework]

[Automata Homework #7]

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Exercises 7.1.3] Construct an npda that accepts the regular language  $L(aaa^*b)$

good! 바르 npda는 찾기 힘들 때 transition graph를 그려보는 것도 좋은 방법임.  
< Representation by transition graph >



$M = (Q = \{q_0, q_1, q_2, q_f\}, \Sigma = \{a, b\}, \Gamma = \{1, z\}, q_0, z, \{q_f\})$

$\delta(q_0, a, z) = \{(q_1, 1z)\}$   
 $\delta(q_1, a, 1) = \{(q_2, \lambda)\}$   
 $\delta(q_2, a, z) = \{(q_2, z)\}$   
 $\delta(q_2, b, z) = \{(q_f, z)\}$

$q_0$ : 초기상태

$q_1$ : a가 하나

$q_2$ : a가 두개, a가 두개나온후 a를 반복해서 받음

$q_f$ : b를 하나 받음, final

good!  $w = aaaab$  제대로 동작하는지 확인해 보는 것도 반드시 필요!

$(q_0, aaaab, z) \vdash (q_1, aaab, 1z) \vdash (q_2, aab, z)$

$\vdash (q_2, ab, z) \vdash (q_2, b, z) \vdash (q_f, \lambda, z)$

Exercises 7.2.4] Construct an npda that accepts the language generated by the grammar  $S \rightarrow aSSS | ab$

① 먼저 GNF로 변환한다. (GNF :  $A \rightarrow aX$  ( $X$  in  $V^*$ ,  $a$  in  $T$ ))

$S \rightarrow aSSS | aB$

$B \rightarrow b$

② 초기상태  $q_0$ 에서 S를 stack에 넣고,  $q_1$ 상태로 바꿈.

$\delta(q_0, \lambda, z) = \{(q_1, Sz)\}$

③  $S \rightarrow aSSS | aB$

$\delta(q_1, a, S) = \{(q_1, SSS), (q_1, B)\}$

④  $B \rightarrow b$

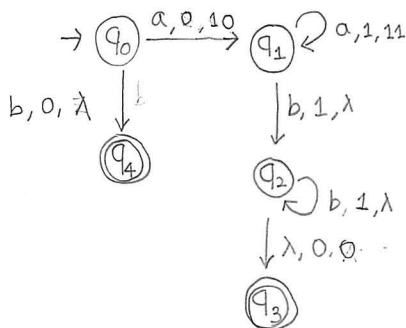
$\delta(q_1, b, B) = \{(q_1, \lambda)\}$

⑤ Completion of derivation

$\delta(q_1, \lambda, z) = \{(q_f, z)\}$

$M = (\{q_0, q_1, q_f\}, \{a, b\}, \{S, A, B, z\}, \delta, q_0, z, \{q_f\})$

Exercises 7.3.3] Is the language  $L = \{a^n b^n : n \geq 1\} \cup \{b\}$  ?



$M = (\{q_0, q_1, q_2, q_3, q_4\}, \{a, b\}, \{0, 1\}, q_0, z=0, F=\{q_3, q_4\})$

$\delta(q_0, a, 0) = \{(q_1, 10)\}$

$\delta(q_0, b, 0) = \{(q_4, \lambda)\}$

$\delta(q_1, a, 1) = \{(q_1, 11)\}$

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

$\delta(q_2, b, 1) = \{(q_2, \lambda)\}$

$\delta(q_2, \lambda, 0) = \{(q_3, 0)\}$

$w = aabbb$

$\therefore M$ 은 정의 7.3의 DPDA의 조건을 만족하므로 DPDL이다

$(q_0, aabbb, 0) \vdash (q_1, abb, 10) \vdash (q_1, bb, 110)$

good!

$\vdash (q_2, b, 10) \vdash (q_2, \lambda, 0) \vdash (q_3, \lambda, 0)$

final