오토마타 및 형식언어(COMP315)

Homework 4

Due date: 2019년 6월 7일 (금)

Late submission not allowed

How to submit: Upload the answers as one PDF file to LMS

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Q1, 5점) Chapter 7.1, Exercise 1 (pg. 189)

a) 언어 $L = \{a^n b^{2n} : n \ge 0\}$ 을 나타내는 Pushdown Automata를 구하시오

답: $M = (\{q_0, q_1, q_f\}, \{a, b\}, \{a, b, z\}, \delta, q_0, z, F)$

Transition functions (δ): $\delta(q_0, a, z) = \{(q_0, aaz)\}$, $\delta(q_0, a, a) = \{(q_0, aaa)\}$, $\delta(q_0, \lambda, z) = \{(q_1, z)\}$, $\delta(q_0, \lambda, a) = \{(q_1, a)\}$, $\delta(q_1, b, a) = \{(q_1, a)\}$, $\delta(q_1, \lambda, z) = \{(q_2, z)\}$

b) 위의 언어에 속하는 w=aabbbb를 accept하는 과정을 (instantaneous description) 보이시오

Q2, 5점) Chapter 7.1, Exercise 12 (pg. 190)

다음 오토마타는 어떠한 언어 L을 나타내는가?

$$M = (\{q_0, q_1, q_2, q_3, q_4, q_5\}, \{a, b\}, \{0, 1, z\}, \delta, q_0, z, \{q_5\})$$

Transition fuctions (δ):

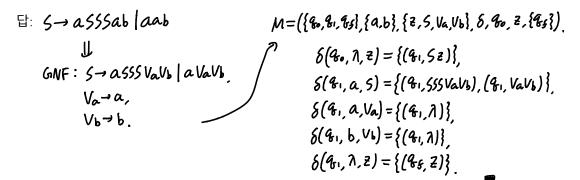
$$\begin{split} &\delta(q_0,b,z) = \{(q_1,1z)\},\\ &\delta(q_1,b,1) = \{(q_2,11)\},\\ &\delta(q_2,a,1) = \{(q_3,\lambda)\},\\ &\delta(q_3,a,1) = \{(q_4,\lambda)\},\\ &\delta(q_4,a,z) = \{(q_4,z),(q_5,z)\}. \end{split}$$

Q3, 5점) Chapter 7.2, Exercise 2 (pg. 201)

다음 grammar를 PDA로 나타내시오

 $S \rightarrow aSSSab|\lambda$

Hint: Greibach form으로 우선 변환 후 $transition function(\delta)$ 들을 정의



Q4, 5점) Chapter 8.1, Exercise 1 (pg. 221)

언어 $L=\{w:n_a(w)< n_b(w)< n_c(w)\}$ 이 context-free 하지 않다는 것을 pumping lemmar를 사용하여 보이시오

답: 충분히 큰 mai chàn w=ambmti cmt2 만하다. WELOIZ |W| 2molch.

Decomposition W=UVXYZ | VXY | Em , |VX | 2 | OI CHOM

(1)
$$V=a^{k}$$
, $y=a^{l} \rightarrow W_{2}=uV^{2}xy^{2}z$
= $a^{m+k+l}b^{m+l}c^{m+2}$ | vy | $\geq |o|e_{2}$ ktl $\geq |i|$ $\therefore n_{a}(w) \geq n_{b}(w)$.

②
$$V=a^{k}$$
, $y=b^{l} \rightarrow W_{2} = a^{mtk}b^{m+itl}c^{mt2}$.
 $l \ge l \text{ old} \quad n_{b}(w) \ge n_{c}(w)$.
 $l \ge l \text{ old} \quad n_{a}(w) \ge n_{b}(w)$

3 V=bt, y=bl -> W2 = amb mt1+tet cm+2. Let 21 : nb(w) ≥ nc(w).

@
$$V=b^{-1}$$
, $Y=C^{-1} \to W_0 = UXE = A^{-1}b^{-1}h^{-1}h^{-1}C^{-1}h^{-1}$

#21 old $N_0(w) \ge N_0(w)$,

1≥1 old $N_0(w) \ge N_0(w)$.