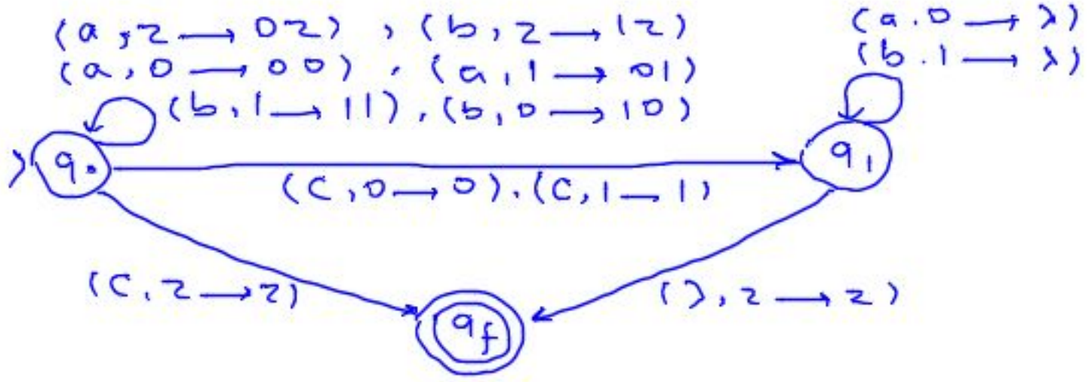
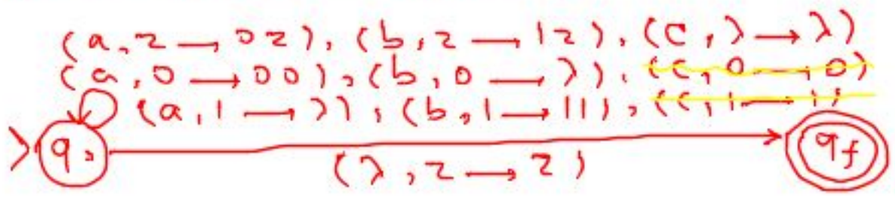
Chapter 7

1) $\Sigma = \{a, b, c\}$

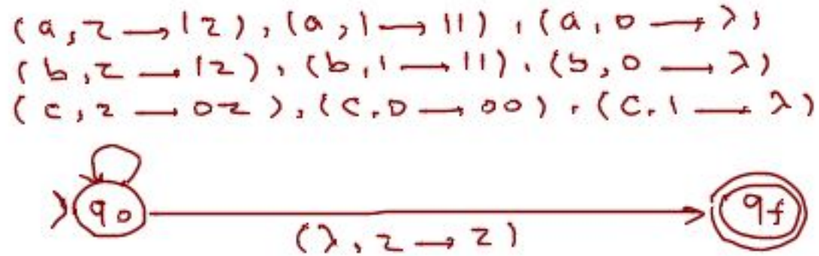
2) $\{wcw^R : w \in (a,b)^*\}$



3) $\{w : n_a(w) = n_b(w)\}$



4) $\{w : n_a + n_b = n_c\}$



۴) $L = \{ a^n b^m : n, m \geq 0, n \neq m \} = \{ a^n b^n : n < m \} \cup \{ a^n b^m : n > m \}$

$= \{a^n b^n\}\{b\}^+ \cup \{a\}^+ \{a^n b^m\}$

$S \longrightarrow S_1 \mid S_2$

$S_1 \longrightarrow AB$

$A \longrightarrow aAb \mid \lambda$

$B \longrightarrow bB \mid b$

$S_2 \longrightarrow CA$

$C \longrightarrow aC \mid a$

$a, a \longrightarrow \lambda$

$b, b \longrightarrow \lambda$

$\lambda, S \longrightarrow S_1$

$\lambda, S \longrightarrow S_2$

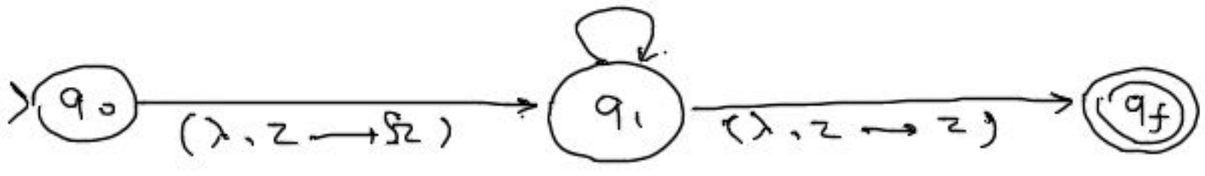
$\lambda, S_1 \longrightarrow AB$ $\quad \lambda, S_2 \longrightarrow CA$

$\lambda, A \longrightarrow aAb$ $\quad \lambda, C \longrightarrow aC$

$\lambda, A \longrightarrow \lambda$

$\lambda, B \longrightarrow bB$

$\lambda, B \longrightarrow b$



۳)

$S \longrightarrow aSbb \mid aab$

$(a, a \longrightarrow \lambda), (b, b \longrightarrow \lambda)$

$(\lambda, S \longrightarrow aSbb)$

$(\lambda, S \longrightarrow aab)$

۴)

$$\delta : Q \times (\Sigma \cup \{\lambda\})^{\times \Gamma} \longrightarrow 2^{Q \times (\Gamma\Gamma \cup \Gamma \cup \{\lambda\})}$$

(q, λ)
(q, a)
(q, ab)

$$\delta(q, c, a) = (q', b_n b_{n-1} \cdots b_2 b_1 a)$$

$$\begin{cases} \delta'(q, c, a) = (q_1, b_1 a) \\ \delta'(q_1, \lambda, b_1) = (q_2, b_2 b_1) \\ \quad \vdots \\ \delta'(q_{n-1}, \lambda, b_{n-1}) = (q', b_n b_{n-1}) \end{cases}$$

اثبات با استقرا روی n کامل می‌شود.

۵)

برای هر NPDA ، یک گرامر G مستقل از متن وجود دارد .

برای هر گرامر مستقل از متن یک NPDA با سه حالت وجود دارد .

برای هر NPDA یک NPDA با سه حالت وجود دارد .

5)

$\delta(q_0, a, Z) = \{(q_0, AZ)\}$

$\delta(q_0, b, A) = \{(q_0, AA)\}$

$\delta(q_0, a, A) = \{(q_1, \lambda)\}$

$L = L(ab^*a)$

$S \longrightarrow aBa$

$B \longrightarrow bB \mid \lambda$

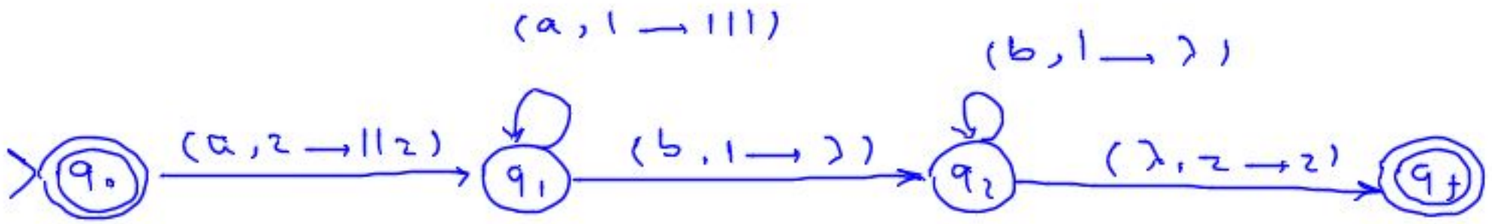
$(q_0 A q_1) \longrightarrow a$

$(q_0 Z q_k) \longrightarrow a(q_0 A q_l)(q_l Z q_k)$ $\quad k, l = 0, 1$

$(q_0 A q_k) \longrightarrow b(q_0 A q_l)(q_l A q_k)$ $\quad k, l = 0, 1$

v) $L = \{ a^n b^{2n} : n \geq 0 \}$

DPDA



∧)

REG LANG.

⇓

DFA

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$\delta(q, a) = q'$

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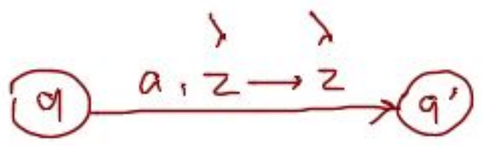
DPDA ⟹ DCFL



$\delta'(q, a, z) = \{ (q', z) \mid$

$a \in \Sigma$

9)

$$L = \{ wcw^R v : w, v \in \{a,b\}^* \} \qquad \text{DCFL}$$

$$L^R = \{ v^R w c w^R : w, v \in \{a,b\}^* \} \qquad \text{NDCFL}$$

تعیین مرز v^R و w به طور قطعی ممکن نیست.

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$$L = \{ wcw^R v : w, v \in \{a,b\}^* \} \qquad \text{DCFL}$$

$$L^R = \{ v^R w c w^R : w, v \in \{a,b\}^* \} \qquad \text{NDCFL}$$

تعیین مرز v^R و w به طور قطعی ممکن نیست.

10) $L = \{ w : n_a(w) = n_b(w) \}$

$$S \to aAbS \mid bBaS \mid \lambda$$
$$A \to aAbA \mid \lambda$$
$$B \to bBaB \mid \lambda$$

LL(1)

$$S \to aSb \mid bSa \mid SS \mid \lambda$$

~~LL(1)~~