

س^۱ →

۱.۱ → فرض می‌کنیم $v = wa$ است $\rightarrow v^R = (wa)^R = w^R a$

$$(uv)^R = (uwa)^R = \underbrace{a w^R u^R}_{v^R} = v^R u^R$$

۲.۱ → فرض می‌کنیم $w = av$ است $\rightarrow (w^R)^R = ((av)^R)^R = \underbrace{(av^R)}_{av} = av = w$

۳.۱ → ۱.۱ صحت $\rightarrow (uv)^R = u^R v^R \xrightarrow[u \in L_r]{v \in L_l} (L_l L_r)^R = L_l^R L_r^R$

س^۲ →

۱.۲ → P: $S \rightarrow aAAa$
 $A \rightarrow bA \mid \lambda$
 $G = (\{s, A\}, \{a, b\}, s, P)$

۲.۲ → P: $S \rightarrow aAAa$
 $A \rightarrow abA \mid aA \mid \lambda$
 $G = (\{s, A\}, \{a, b\}, s, P)$

۳.۲ → P: $S \rightarrow A \mid aA \mid aaA \mid aaAa$
 $A \rightarrow bA \mid \lambda$
 $G = (\{s, A\}, \{a, b\}, s, P)$

۴.۲ → P: $S \rightarrow aAb$
 $A \rightarrow aA \mid bA \mid aAb \mid \lambda$
 $G = (\{s, A\}, \{a, b\}, s, P)$

$$\text{Q.2} \rightarrow P: \begin{aligned} S &\rightarrow bbA \\ A &\rightarrow aA \mid bAb \mid \lambda \end{aligned}$$

$$G = (\{S, A\}, \{a, b\}, S, P)$$

Q.3 \rightarrow

$$\text{I.3} \rightarrow P: \begin{aligned} S &\rightarrow aA \\ A &\rightarrow aAb \mid aA \mid \lambda \end{aligned}$$

$$G_1 = (\{S, A\}, \{a, b\}, S, P)$$

$$\text{2.3} \rightarrow P: \begin{aligned} S &\rightarrow aaaaaAbbbb bbb \\ A &\rightarrow aaAbbbb \mid \lambda \end{aligned}$$

$$G_2 = (\{S, A\}, \{a, b\}, S, P)$$

$$\text{3.3} \rightarrow P: \begin{aligned} S &\rightarrow aaaAb \\ A &\rightarrow aAb \mid \lambda \end{aligned}$$

$$G_3 = (\{S, A\}, \{a, b\}, S, P)$$

$$\text{3.4} \rightarrow P: \begin{aligned} S &\rightarrow aA \mid bA \\ A &\rightarrow aA \mid bA \mid \lambda \end{aligned}$$

$$G_4 = (\{S, A\}, \{a, b\}, S, P)$$

Q.4 \rightarrow

$$\text{I.4} \rightarrow L_n = \{a^n b^m a^n b^{qn} : n \geq 0, m > n\}$$

P:

$$S \rightarrow AB$$

$$A \rightarrow cb$$

$$C \rightarrow acb \mid cb \mid \lambda$$

$$B \rightarrow aBbb \mid \lambda$$

$$S \rightarrow AbB$$

$$A \rightarrow aAb \mid Ab \mid \lambda$$

$$B \rightarrow aBbb \mid \lambda$$

$$S \rightarrow S_1 S_r$$

$$\text{2.4} \rightarrow P: \begin{aligned} S &\rightarrow Ab \mid B \end{aligned}$$

$$A \rightarrow aAb \mid \lambda$$

$$B \rightarrow aBbb \mid \lambda$$

$$S \rightarrow S_1 \mid S_r$$

۳.۴ → $L_1^* = \{ a^h b^m a^h b^m a^h b^m : h \geq 0, m > h \}$

P: $S \rightarrow AbAbAb$

$A \rightarrow aAb | Ab | \lambda$

$S \rightarrow S_1 S_1 S_1$

۴.۴ → $L_1^* = ?$ $L_1 = \{ a^h b^m : h \geq 0, m > h \}$

$S \rightarrow SA | \lambda$

$A \rightarrow aAb | Ab | \lambda$

$S \rightarrow SS_1 | \lambda$

۵.۳ →

۱.۵ → P: $s \rightarrow a|aa|aaas$

$G = (\{s\}, \{a\}, s, P)$

۲.۵ → P: $s \rightarrow aaas | \lambda$

$G = (\{s\}, \{a\}, s, P)$

۶.۳ →

۱.۴ → $s \rightarrow ss$ 1
 $s \rightarrow sss$ 2
 $s \rightarrow asb$ 3
 $s \rightarrow \lambda$ 4

$s \xRightarrow{2} sss \text{ یا } s \xRightarrow{1} ss \xRightarrow{1} sss$ +

$s \rightarrow ss$ 1
 $s \rightarrow asb$ 2
 $s \rightarrow \lambda$ 3

$s \xRightarrow{1} ss \xRightarrow{1} sss$ *

سابق + و * این گرامر معادل هم اند

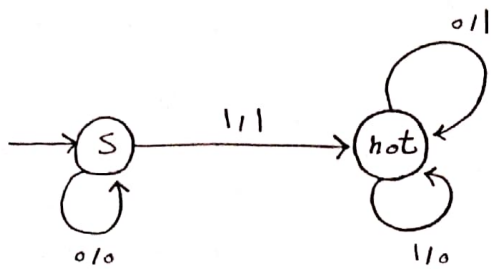
۲.۴ → $s \rightarrow asb | bsal a$ گرامر نمی تولید کند در حالی که گرامر $s \rightarrow ss | asb | \lambda | bsal a$

اصلاً نمی تواند رشته بی تولید کند پس این گرامر معادل هم نیستند

س

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س¹ →



س⁹ → —

س¹⁰ →

