

# WORKSHOP N°1

DATE: 05-10-24

## THE OLD TIMES

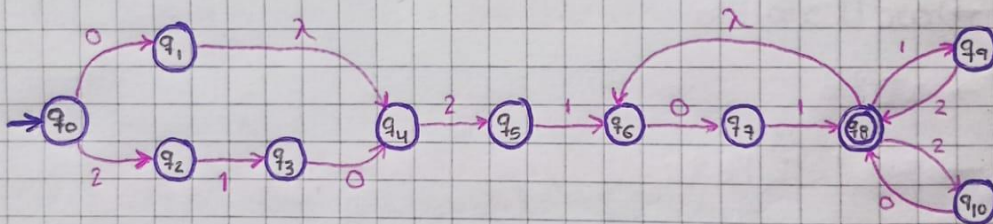
PROFESSOR: Eng. Carlos Andrés Sierra Virgüez, M.Sc.

STUDENT: Luis Alejandro Cely Dietz

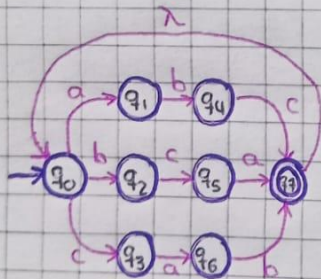
INSTITUTION: Francisco José de Caldas District University

①

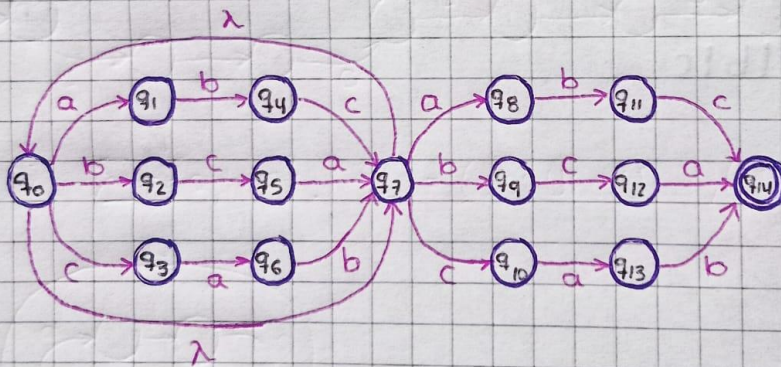
(i)  $\Sigma = \{0, 1, 2\}$ .  $L = (01^*2 \cup 2102)^* 101 (01 \cup 12 \cup 20)^*$



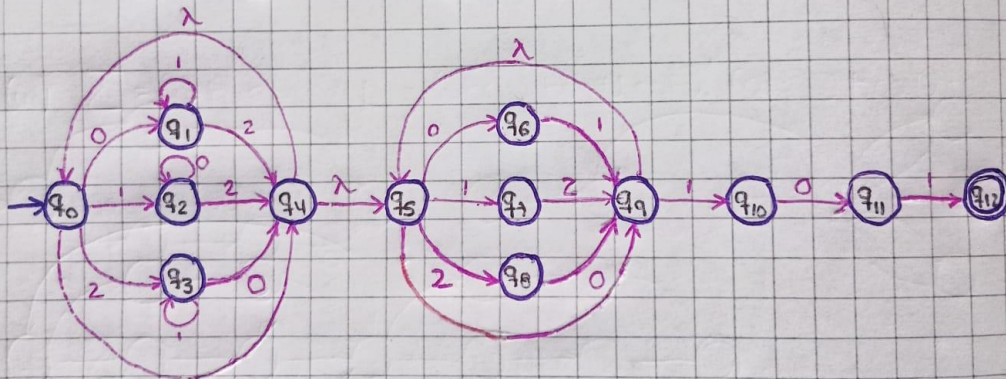
(ii)  $\Sigma = \{a, b, c\}$ .  $L = (abc \cup bca \cup cab)(abc \cup bca \cup cab)^*$



(iii)  $\Sigma = \{a, b, c\}$   $L = (abc \cup bca \cup cab)^* (abc \cup bca \cup cab)$



(iv)  $\Sigma = \{a, b, c\}$   $L = (01^*2 \cup 10^*2 \cup 21^*0)^* (01 \cup 12 \cup 20)^* 101$





(2)

(i)  $\Sigma = \{0, 1\}$

Answer:  $L = [(00^*10^*)(01^* \cup 01^*1)]^*$

$$G = \begin{cases} S \rightarrow 0q_1 \mid \lambda \\ q_1 \rightarrow 0q_1 \mid 1q_2 \\ q_2 \rightarrow 0q_2 \mid 0q_3 \\ q_3 \rightarrow 1q_3 \mid 1S \mid 1 \end{cases}$$

(ii)  $\Sigma = \{a, b, c\}$

Answer:  $L = \{(aub)[(ca)^*c \cup (ca)^*ca \cup c \cup ca](buc)^*\} \cup \{(buc)[(ac)^*a \cup (ac)^*aa \cup a \cup aa](buc)^*\}$

$$G = \begin{cases} S \rightarrow aq_1 \mid bq_1 \mid bq_2 \mid cq_2 \\ q_1 \rightarrow cq_2 \mid cq_3 \mid c \\ q_2 \rightarrow aq_1 \mid aq_3 \mid a \\ q_3 \rightarrow aq_4 \mid a \\ q_4 \rightarrow bq_4 \mid cq_4 \mid b \mid c \end{cases}$$

③ (i)  $L = \{a^i b^j c^j d^i : i, j \geq 1\}$

Answer:

$$G = \begin{cases} S \rightarrow A \\ A \rightarrow aAd \mid aBd \\ B \rightarrow bBc \mid bc \end{cases}$$

(ii)  $L = \{a^i b^i c^j d^j : i, j \geq 1\}$

Answer

$$G = \begin{cases} S \rightarrow AB \\ A \rightarrow aAb \mid ab \\ B \rightarrow cBd \mid cd \end{cases}$$

(iii)  $L = \{a^i b^i c^j d^j : i, j \geq 1\} \cup \{a^i b^j c^j d^i : i, j \geq 1\}$

Answer

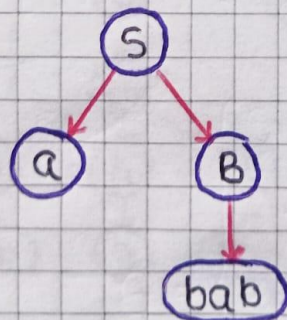
$$G = \begin{cases} S \rightarrow A \mid C \\ A \rightarrow aAd \mid aBd \\ B \rightarrow bBc \mid bc \\ C \rightarrow aAb \mid aDb \\ D \rightarrow cDd \mid cd \end{cases}$$

(iv)  $L = \{a^i b^j c^{i+j} : i \geq 0, j \geq 1\}$

Answer:

$$G = \begin{cases} S \rightarrow A \\ A \rightarrow aAc \mid B \\ B \rightarrow bB \mid bc \end{cases}$$

④ (i)  $w_1 = abab$

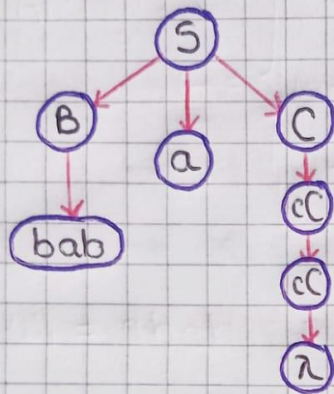


Answer:

$$S \rightarrow aB \rightarrow abab$$



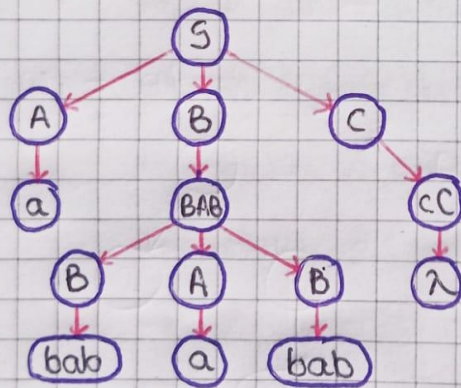
(ii)  $w_2 = babacc$



Answer:

$S \rightarrow BaC \rightarrow babaC \rightarrow babacC$   
 $\rightarrow babaccC \rightarrow babacc$

(iii)  $w_3 = ababababc$



Answer:

$S \rightarrow ABC \rightarrow aBC \rightarrow aBABC$   
 $\rightarrow ababABC$   
 $\rightarrow ababaBC$   
 $\rightarrow ababababC$   
 $\rightarrow ababababacC$   
 $\rightarrow abababababc$

⑤

(i)  $w_1 = 47.236$

$\langle \text{real} \rangle \rightarrow \langle \text{digits} \rangle \langle \text{decimal} \rangle \langle \text{exp} \rangle$

$\rightarrow \langle \text{digits} \rangle \langle \text{digits} \rangle \langle \text{decimal} \rangle \langle \text{exp} \rangle$

$\rightarrow \langle \text{digits} \rangle \langle \text{digits} \rangle . \langle \text{digits} \rangle \langle \text{exp} \rangle$

$\rightarrow \langle \text{digits} \rangle \langle \text{digits} \rangle . \langle \text{digits} \rangle \langle \text{digits} \rangle \langle \text{exp} \rangle$

$\rightarrow \langle \text{digits} \rangle \langle \text{digits} \rangle . \langle \text{digits} \rangle \langle \text{digits} \rangle \langle \text{digits} \rangle \langle \text{exp} \rangle$

$\rightarrow 47. \langle \text{digits} \rangle \langle \text{digits} \rangle \langle \text{digits} \rangle \langle \text{exp} \rangle$

$\rightarrow 47.236 \langle \text{exp} \rangle$

$\rightarrow 47.236$

(ii)  $w_2 = 321.25E + 35$

$\langle \text{real} \rangle \rightarrow \langle \text{digits} \rangle \langle \text{decimal} \rangle \langle \text{exp} \rangle$

$\rightarrow \langle \text{digits} \rangle \langle \text{digits} \rangle \langle \text{decimal} \rangle \langle \text{exp} \rangle$

$\rightarrow \langle \text{digits} \rangle \langle \text{digits} \rangle \langle \text{digits} \rangle \langle \text{decimal} \rangle \langle \text{exp} \rangle$

$\rightarrow 321 \langle \text{decimal} \rangle \langle \text{exp} \rangle$

$\rightarrow 321. \langle \text{digits} \rangle \langle \text{exp} \rangle$

$\rightarrow 321. \langle \text{digits} \rangle \langle \text{digits} \rangle \langle \text{exp} \rangle$

$\rightarrow 321.25 \langle \text{exp} \rangle$

$\rightarrow 321.25E + \langle \text{digits} \rangle$

$\rightarrow 321.25E + \langle \text{digits} \rangle \langle \text{digits} \rangle$

$\rightarrow 321.25E + 35$



(iii)  $\omega_3 = 0.8E9$

$\langle \text{real} \rangle \rightarrow \langle \text{digits} \rangle \langle \text{decimal} \rangle \langle \text{exp} \rangle$

$\rightarrow 0 \langle \text{decimal} \rangle \langle \text{exp} \rangle$

$\rightarrow 0. \langle \text{digits} \rangle \langle \text{exp} \rangle$

$\rightarrow 0.8 \langle \text{exp} \rangle$

$\rightarrow 0.8E \langle \text{digits} \rangle$

$\rightarrow 0.8E9$

(iv)  $\omega_4 = 0.8E+9$

$\langle \text{real} \rangle \rightarrow \langle \text{digits} \rangle \langle \text{decimal} \rangle \langle \text{exp} \rangle$

$\rightarrow 0 \langle \text{decimal} \rangle \langle \text{exp} \rangle$

$\rightarrow 0. \langle \text{digits} \rangle \langle \text{exp} \rangle$

$\rightarrow 0.8E + \langle \text{digits} \rangle$

$\rightarrow 0.8E + 9$

⑥

(c)  $w_1 = \text{MyVariable}$

$\langle \text{identifier} \rangle \rightarrow \langle \text{letter} \rangle \langle \text{lds} \rangle$

$\rightarrow M \langle \text{letter} \rangle \langle \text{lds} \rangle$

$\rightarrow My \langle \text{letter} \rangle \langle \text{lds} \rangle$

$\rightarrow MyV \langle \text{letter} \rangle \langle \text{lds} \rangle$

$\rightarrow MyVa \langle \text{letter} \rangle \langle \text{lds} \rangle$

$\rightarrow MyVar \langle \text{letter} \rangle \langle \text{lds} \rangle$

$\rightarrow MyVari \langle \text{letter} \rangle \langle \text{lds} \rangle$

$\rightarrow MyVaria \langle \text{letter} \rangle \langle \text{lds} \rangle$

$\rightarrow MyVariab \langle \text{letter} \rangle \langle \text{lds} \rangle$

$\rightarrow MyVariabl \langle \text{letter} \rangle \langle \text{lds} \rangle$

$\rightarrow MyVariable$

(ii)  $w_2 = \text{temp}2$

$\langle \text{identifier} \rangle \rightarrow \langle \text{letter} \rangle \langle \text{lsds} \rangle$   
 $\rightarrow t \langle \text{letter} \rangle \langle \text{lsds} \rangle$   
 $\rightarrow te \langle \text{letter} \rangle \langle \text{lsds} \rangle$   
 $\rightarrow tem \langle \text{letter} \rangle \langle \text{lsds} \rangle$   
 $\rightarrow temp \langle \text{digit} \rangle \langle \text{lsds} \rangle$   
 $\rightarrow temp2$

(iii)  $w_3 = \text{string}2\text{int}$

$\langle \text{identifier} \rangle \rightarrow \langle \text{letter} \rangle \langle \text{lsds} \rangle$   
 $\rightarrow s \langle \text{letter} \rangle \langle \text{lsds} \rangle$   
 $\rightarrow st \langle \text{letter} \rangle \langle \text{lsds} \rangle$   
 $\rightarrow str \langle \text{letter} \rangle \langle \text{lsds} \rangle$   
 $\rightarrow stri \langle \text{letter} \rangle \langle \text{lsds} \rangle$   
 $\rightarrow strin \langle \text{letter} \rangle \langle \text{lsds} \rangle$   
 $\rightarrow string \langle \text{digit} \rangle \langle \text{lsds} \rangle$   
 $\rightarrow string2 \langle \text{letter} \rangle \langle \text{lsds} \rangle$   
 $\rightarrow string2i \langle \text{letter} \rangle \langle \text{lsds} \rangle$   
 $\rightarrow string2in \langle \text{letter} \rangle \langle \text{lsds} \rangle$   
 $\rightarrow string2int$



(iv)  $w_4 = 2\text{NotAVariable}$

It can't be built with the given grammar, though the alphabet is correct