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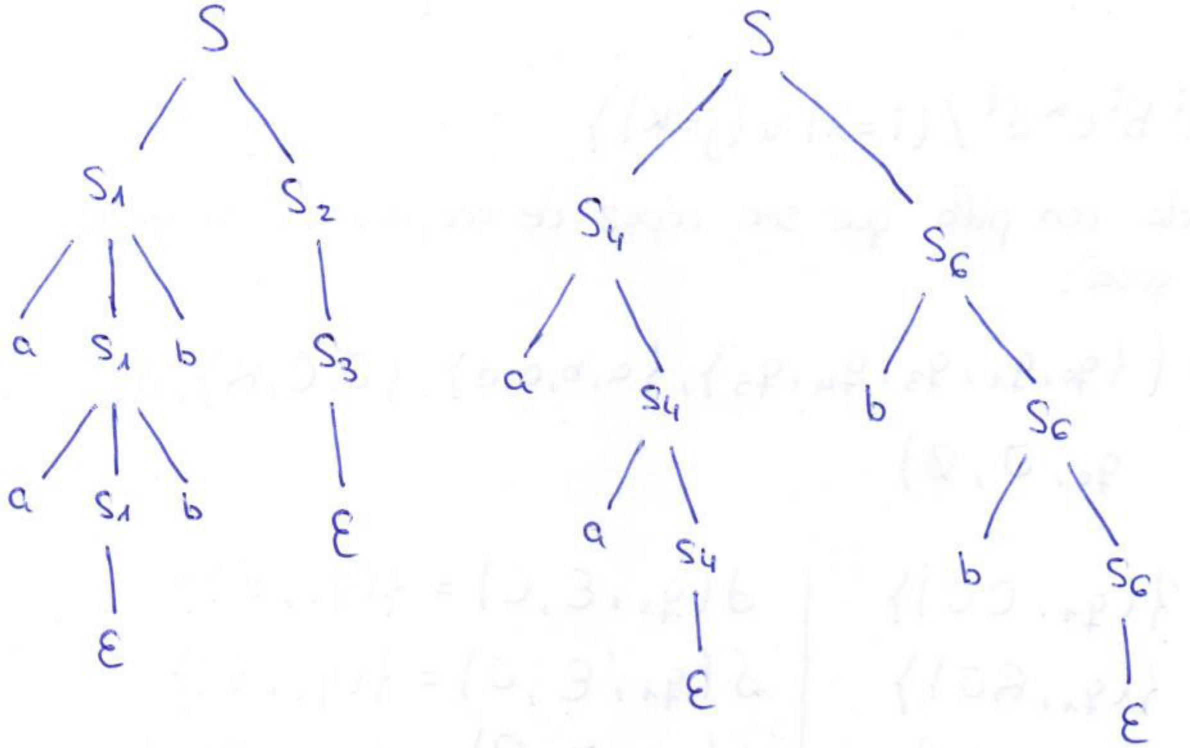
Grupo C

Relación Práctica 2

(1.) Podemos comprobar que la gramática es ambigua ya que podemos generar la misma palabra con 2 árboles distintos:

Palabra → aabb



- Determina el lenguaje que genera esta gramática

Es la unión de dos lenguajes

$L_1 = \{ a^i b^i c^j d^k : i, j, k \geq 0 \}$

$L_2 = \{ a^i b^j c^k d^k : i, j, k \geq 0 \}$

$L_1 \cup L_2 = \{ a^i b^i c^j d^k : i, j, k \geq 0 \} \cup \{ a^i b^j c^k d^k : i, j, k \geq 0 \}$

• Gramática no ambigua

$S \to S_1 S_2$

$S_1 \to a S_1 b \mid \varepsilon$

$S_2 \to c S_2 d \mid S_3 \mid S_4$

$S_3 \to c S_3 \mid c$

$S_4 \to d S_4 \mid d$

$S \to S_5 S_6$

$S_5 \to a S_5 b \mid S_7 \mid S_8$

$S_6 \to c S_6 d \mid \varepsilon$

$S_7 \to a S_7 \mid a$

$S_8 \to b S_8 \mid b$

$S \to S_9 S_{10}$

$S_9 \to a S_9 b \mid \varepsilon$

$S_{10} \to c S_{10} d \mid \varepsilon$

5-

$L = \{ a^i b^j c^k d^l / (i = l) \vee (j = k) \}$

Un autómata con pila que sea capaz de aceptar el lenguaje anterior será:

$M = (\{q_0, q_1, q_3, q_4, q_5\}, \{a, b, c, d\}, \{J, C, R\}, \delta, q_0, J, \emptyset)$

$\delta(q_0, a, J) = \{(q_1, CJ)\}$

$\delta(q_0, b, J) = \{(q_1, RJ)\}$

$\delta(q_0, c, J) = \{(q_0, JJ)\}$

$\delta(q_0, d, J) = \{(q_0, JJ)\}$

$\delta(q_0, \varepsilon, C) = \{(q_0, \varepsilon)\}$

$\delta(q_0, \varepsilon, J) = \{(q_0, \varepsilon)\}$

$\delta(q_1, d, C) = \{(q_3, \varepsilon)\}$

$\delta(q_1, a, C) = \{(q_1, CC)\}$

$\delta(q_1, b, C) = \{(q_1, RC)\}$

$\delta(q_1, \varepsilon, C) = \{(q_1, \varepsilon)\}$

$\delta(q_1, \varepsilon, J) = \{(q_1, \varepsilon)\}$

$\delta(q_1, b, R) = \{(q_1, RR)\}$

$\delta(q_1, c, R) = \{(q_2, \varepsilon)\}$

$\delta(q_1, d, R) = \{(q_4, \varepsilon)\}$

$\delta(q_2, c, R) = \{(q_2, \varepsilon)\}$

$\delta(q_2, d, C) = \{(q_2, \varepsilon)\}$

$\delta(q_2, d, R) = \{(q_4, \varepsilon)\}$

$\delta(q_2, c, C) = \{(q_4, C)\}$

$\delta(q_2, \varepsilon, J) = \{(q_2, \varepsilon)\}$

$\delta(q_3, d, C) = \{(q_3, \varepsilon)\}$

$\delta(q_3, \varepsilon, J) = \{(q_3, \varepsilon)\}$

$\delta(q_4, \varepsilon, B) = \{(q_4, \varepsilon)\}$

$\delta(q_4, d, C) = \{(q_4, \varepsilon)\}$

$\delta(q_4, c, B) = \{(q_4, \varepsilon)\}$

$\delta(q_4, d, C) = \{(q_4, \varepsilon)\}$

$\delta(q_4, \varepsilon, C) = \{(q_5, \varepsilon)\}$

$\delta(q_5, \varepsilon, J) = \{(q_5, \varepsilon)\}$

3.

Lo primero que debemos hacer es eliminar las producciones inútiles, para lo que buscaremos las producciones con símbolos terminales.

Declaramos la variable V_t:

$V_t = \{\emptyset\}$, $V_t = \{A, B, C, D\}$, $V_t = \{S, A, B, C, D\}$

Eliminamos las producciones de E:

$S \to A \mid BCa \mid aDcd$

$A \to aAb \mid c$

$B \to CD \mid Ad \mid \varepsilon$

$C \to Cc \mid Bb \mid c$

$D \to aDd \mid Dd \mid \varepsilon$

Ahora debemos eliminar las producciones nulas:

$H = \{\emptyset\}$, $H = \{BD\}$, $H = \{BD\}$

$S \to A \mid BCa \mid Ca \mid aDcd \mid acd$

$A \to aAb \mid c$

$B \to CD \mid Ad$

$C \to Cc \mid Bb \mid c \mid b$

$D \to aDd \mid Dd \mid ad \mid d$

Seguidamente eliminamos las producciones unitarias:

$S \to aAb \mid c \mid BCa \mid Ca \mid aDcd \mid acd$

$A \to aAb \mid c$

$B \to CD \mid Ad$

$C \to Cc \mid Bb \mid c \mid d$

$D \to aDd \mid Dd \mid ad \mid d$

Por último pasamos a Chomsky.

$S \to E_1 F_1 \mid c \mid B F_2 \mid C E_1 \mid E_1 F_3 \mid E_1 F_4$

$A \to E_1 G \mid c$

$B \to C D \mid A E_4$

$C \to C E_3 \mid B E_2 \mid c \mid b$

$D \to E_1 H \mid D E_4 \mid C_1 E_4 \mid d$

$E_1 \to a$	$F_2 \to C E_1$
$E_2 \to b$	$F_3 \to D F_4$
$E_3 \to c$	$F_4 \to E_3 E_4$
$E_4 \to d$	$G \to A E_1$
$F_1 \to A E_2$	$H \to D E_4$

6.- a) $L_1 = \{0^i 1^j 2^k 3^m \,/\, i,j,k \geq 0,\ m = i+j+k\}$ con $A = \{0,1,2,3\}$

Un autómata con pila que sea capaz de aceptar el lenguaje anterior será:

$M = (\{q_0, q_1, q_2, q_3, q_4\}, \{0,1,2,3\}, \{J, C\}, \delta, q_0, J, \emptyset)$

$\delta(q_0, \varepsilon, J) = \{(q_0, \varepsilon)\}$	$\delta(q_2, 1, C) = \{(q_2, CC)\}$
$\delta(q_0, 0, J) = \{(q_1, CJ)\}$	$\delta(q_2, 2, C) = \{(q_3, CC)\}$
$\delta(q_0, 1, J) = \{(q_2, CJ)\}$	$\delta(q_3, 2, C) = \{(q_3, CC)\}$
$\delta(q_0, 2, J) = \{(q_3, CJ)\}$	$\delta(q_1, 3, 3) = \{(q_4, \varepsilon)\}$
$\delta(q_1, 0, C) = \{(q_1, CC)\}$	$\delta(q_2, 3, C) = \{(q_4, \varepsilon)\}$
$\delta(q_1, 1, C) = \{(q_2, CC)\}$	$\delta(q_3, 3, C) = \{(q_4, \varepsilon)\}$
	$\delta(q_4, 3, C) = \{(q_4, \varepsilon)\}$
	$\delta(q_4, \varepsilon, J) = \{(q_4, \varepsilon)\}$

b) $L_2 = \{ 0^i 1^j 2^k 3^m 4 \ / \ i,j,k \geq 0, m = i+j+k \}$ con $A = \{0,1,2,3,4\}$

Un autómata con pila que sea capaz de aceptar el lenguaje anterior será:

$\delta(q_0, \varepsilon, J) = \{(q_0, \varepsilon)\}$

$\delta(q_0, 0, J) = \{(q_1, CJ)\}$

$\delta(q_0, 1, J) = \{(q_2, CJ)\}$

$\delta(q_0, 2, J) = \{(q_3, CJ)\}$

$\delta(q_4, 4, J) = \{(q_5, \varepsilon)\}$

$\delta(q_1, 0, C) = \{(q_1, CC)\}$

$\delta(q_1, 1, C) = \{(q_2, CC)\}$

$\delta(q_2, 1, C) = \{(q_2, CC)\}$

$\delta(q_2, 2, C) = \{(q_3, CC)\}$

$\delta(q_3, 2, C) = \{(q_3, CC)\}$

$\delta(q_1, 3, 3) = \{(q_4, \varepsilon)\}$

$\delta(q_2, 3, C) = \{(q_4, \varepsilon)\}$

$\delta(q_3, 3, C) = \{(q_4, \varepsilon)\}$

$\delta(q_4, 3, C) = \{(q_4, \varepsilon)\}$

$\delta(q_4, \varepsilon, J) = \{(q_5, \varepsilon)\}$