1. Para cada gramática obtener una gramática lineal izquierda equivalente.

a) $G = (\{S, A\}, \{0, 1, 2\}, S, \{S \to 0A|2, A \to 0S|1\})$

b) $G = (\{S, A, B\}, \{a, b, c\}, S, \{S \to aA|bB|cB, A \to aA|bA|cB, B \to aB|bB|\lambda\})$

a)
$$\underbrace{\begin{aligned} &S \to 0A \mid 2F \\ &A \to 0S \mid 1F \\ &F \to \lambda \end{aligned}}_{\text{En forma normal}} \quad \overset{A \to xB}{\underset{B \to Ax}{\Longrightarrow}} \quad \begin{aligned} &A \to S0, \quad F \to S2 \\ &S \to A0, \quad F \to A1 \\ &S \to \lambda \end{aligned} \quad \Longleftrightarrow \quad \begin{aligned} &F \to S2 \mid A1 \\ &A \to S0 \\ &S \to A0 \mid \lambda \end{aligned}$$

Ahora $S = A$, $A = F$, $F = S$

$$P = \begin{cases} S \to A2 \mid F1 \\ F \to A0 \\ A \to F0 \mid \lambda \end{cases}$$

$$\Longrightarrow G_i' = (\{S, A, F\}, \{0, 1, 2\}, S, P)$$

b)
$$\begin{aligned} &S \to aA \mid bB \mid cB \\ &A \to aA \mid bA \mid cB \\ &B \to aB \mid bB \mid \lambda \end{aligned} \quad \overset{A \to xB}{\underset{B \to Ax}{\Longrightarrow}} \quad \begin{aligned} &A \to Sa, \quad B \to Sb, \quad B \to Sc \\ &A \to Aa, \quad A \to Ab, \quad B \to Ac \\ &B \to Ba, \quad B \to Bb \\ &S \to \lambda \end{aligned} \quad \Longleftrightarrow \quad \begin{aligned} &B \to Sb \mid Sc \mid Ac \mid Ba \mid Bb \\ &A \to Sa \mid Aa \mid Ab \\ &S \to \lambda \end{aligned}$$

Ya esta en F.N

Ahora $S = A$, $A = B$, $B = S$

$$P = \begin{cases} S \to Ab \mid Ac \mid Bc \mid Sa \mid Sb \\ B \to Aa \mid Ba \mid Bb \\ A \to \lambda \end{cases}$$

$$\Longrightarrow G_i' = (\{S, A, B\}, \{a, b, c\}, S, P)$$

2. Construir una gramática regular que genere el lenguaje $L = \{a(bc)^n / n \geq 1\}$

$$\begin{tikzcd} S \arrow[r, "a"] & A \arrow[r, "b"] & B \arrow[r, "c"] & \underline{C} \arrow[l, bend left, "b"] \end{tikzcd}$$

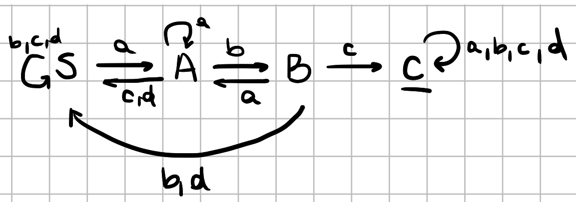
$M = \langle Q, \Sigma, q_0, F, \delta \rangle$

$M = \langle \{S, A, B, C\}, \{a, b, c\}, S, \{C\}, \delta \rangle$

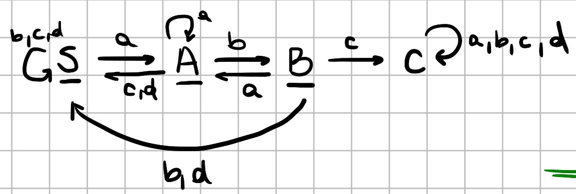
$G = (\{S, A, B, C\}, \{a, b, c\}, S, P)$

$$P = \begin{cases} S \to aA \\ A \to bB \\ B \to cC \\ C \to bB \mid \lambda \end{cases}$$

3. Dado el alfabeto $\Sigma = \{a, b, c, d\}$ construir una gramática regular que genere las cadenas que no contengan la secuencia abc



1. Complemento (AFD y Mínimo)



2. $S \to F$ y $F \to S$

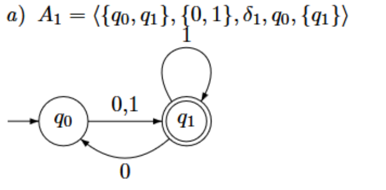
$\Longrightarrow G = (\{S, A, B, C\}, \{a, b, c, d\}, S, P)$

$$P = \begin{cases} S \to \lambda \mid aA \mid bS \mid cS \mid dS \\ A \to \lambda \mid aA \mid bB \mid cS \mid dS \\ B \to \lambda \mid aA \mid bS \mid cC \mid dS \\ C \to aC \mid bC \mid cC \mid dC \end{cases}$$

4. Obtener gramáticas lineales derechas que generen los lenguajes reconocidos por los automatas del ejercicio 7 del TP3.

Ya hechos el ej:

a) $A_1 = \langle \{q_0, q_1\}, \{0, 1\}, \delta_1, q_0, \{q_1\} \rangle$

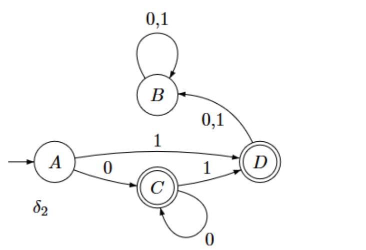


δ_1

$G = (\{q_0, q_1\}, \{0, 1\}, q_0, P)$

$$P = \begin{cases} q_0 \to 0q_1 \mid 1q_1 \\ q_1 \to 0q_0 \mid 1q_1 \end{cases}$$

b) $A_2 = \langle \{A, B, C, D\}, \{0, 1\}, \delta_2, A, \{C, D\} \rangle$

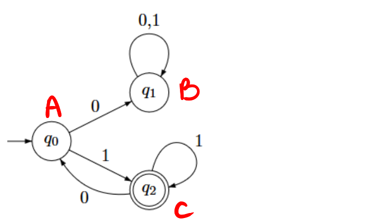


δ_2

$G = (\{A, B, C, D\}, \{0, 1\}, A, P)$

$$P = \begin{cases} A \to 0C \mid 1D \\ B \to 0B \mid 1B \\ C \to 0C \mid 1D \mid \lambda \\ D \to 0B \mid 1B \mid \lambda \end{cases}$$

c) $A_3 = \langle \{q_0, q_1, q_2\}, \{0, 1\}, \delta_3, q_0, \{q_2\} \rangle$



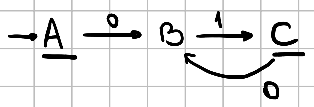
δ_3

$G = (\{A, B, C\}, \{0, 1\}, A, P)$

$$P = \begin{matrix} A \to 0B \mid 1C \\ B \to 0B \mid 1B \\ C \to 0A \mid 1C \mid \lambda \end{matrix}$$

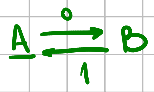
5. Construir AFD mínimos que reconozcan el lenguaje generado por cada gramática:

a) G_1 con las producciones:
$A \to 0B|\lambda$
$B \to 1C|1$
$C \to 0B$

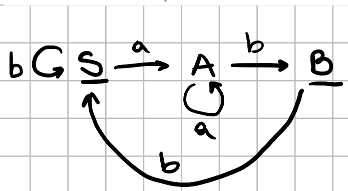


$\Longrightarrow$ $\frac{Q}{E_0} = \{\{B\},\{A,C\}\}$

$\frac{Q}{E_1} = \{\{B\},\{A\}\}$ $\Longrightarrow$



b) G_2 con las producciones:
$S \to bS|aA|\lambda$
$A \to aA|bB$
$B \to bS|\lambda$

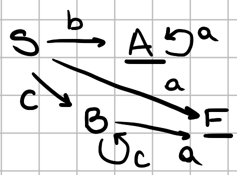


$\Longrightarrow$

	a	b
S	A	S
A	A	B
B	$\emptyset$	S

$\Longrightarrow$ Es min

c) G_3 con las producciones:
$S \to bA|cB|a|b$
$A \to aA|a$
$B \to cB|a$



$\Longrightarrow$

	a	b	c
S	F	A	B
A	A	$\emptyset$	$\emptyset$
B	F	$\emptyset$	B
F	$\emptyset$	$\emptyset$	$\emptyset$

$\Longrightarrow$ Es min

6. Llevar a forma normal las siguientes gramáticas regulares:

a) G_1 con producciones:
$S \to T|R$
$T \to aT|V$
$V \to bV|b$
$R \to cX|e$
$X \to cX|cd$

1) Elimino prod. unitarias

$S \to aT|bV|b|cX|e$
$T \to aT|bV|b$
$V \to bV|b$
$R \to cX|e$
$X \to cX|cd$

2. Elimino simbolos inalcanzables (R)

3. Elimino anulables

$\Rightarrow P(G_1') = S \to aT|bV|bF|cX|eF$
$T \to aT|bV|bF$
$V \to bV|bF$
$R \to cX|eF$
$X \to cX|cA$
$A \to dF$
$F \to \lambda$

b) G_2 con producciones:
$S \to aT|V$
$T \to aR|bR$
$R \to aR|bR|V$
$V \to cV|\lambda$