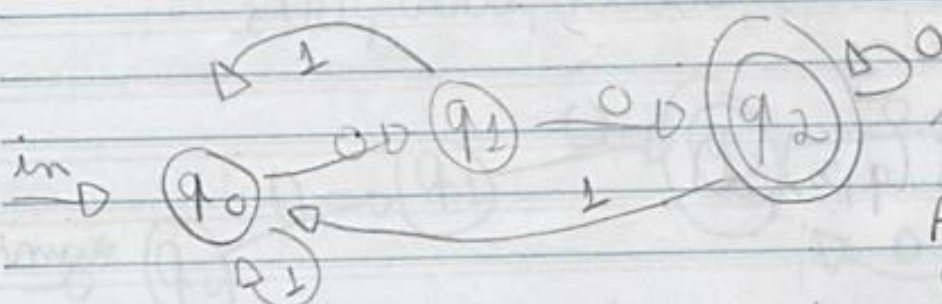


ex. 1 $\Sigma = \{0, 1\}$

a) $L = \{w \mid w \text{ termina em } 00\}$

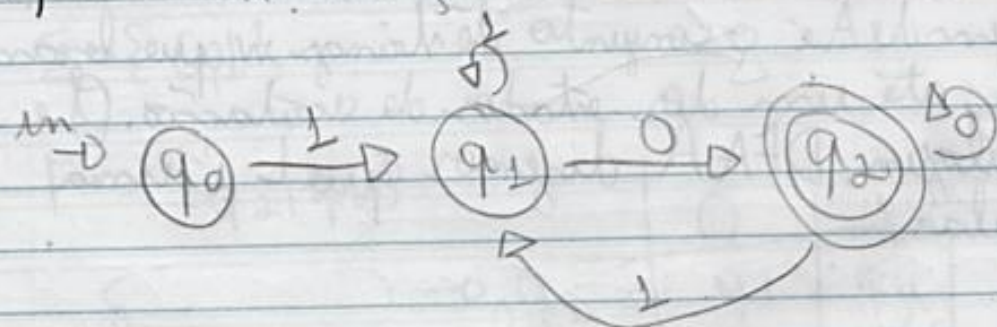


δ :

	0	1
$\rightarrow q_0$	q_1	q_0
q_1	q_2	q_0
$*q_2$	q_2	q_1

$A = \{Q, \Sigma, \delta, q_0, F\}$
 $Q = \{q_0, q_1, q_2\}$
 $\Sigma = \{0, 1\}$
 $F = \{q_2\}$

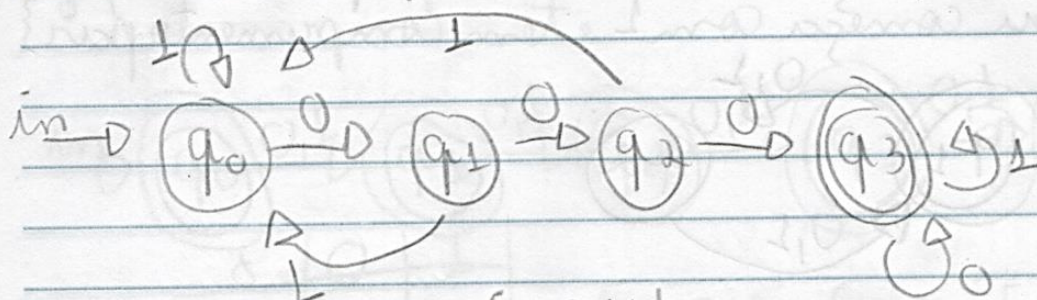
b) $L = \{w \mid w \text{ começa com } 1 \text{ e termina com } 0\}$



$A = \{Q, \Sigma, \delta, q_0, F\}$
 $Q = \{q_0, q_1, q_2\}$
 $\Sigma = \{0, 1\}$
 $F = \{q_2\}$

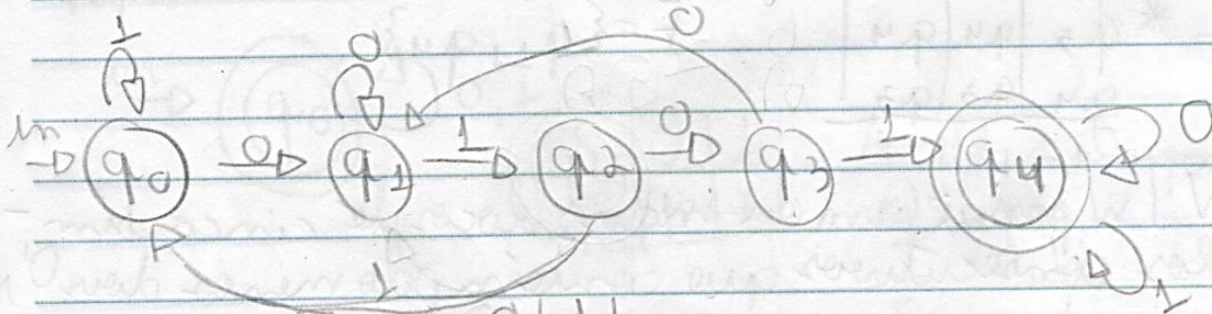
δ	0	1
$\rightarrow q_0$	q_0	q_1
q_1	q_1	q_2
$*q_2$	q_1	q_2

c) $L = \{W \mid W \text{ possui três } 0\text{'s consecutivos}\}$



	δ	0	1
$A = \{Q, \Sigma, \delta, q_0, F\}$	q_0	q_1	q_0
$Q = \{q_0, q_1, q_2, q_3\}$	q_1	q_2	q_0
$\Sigma = \{0, 1\}$	q_2	q_3	q_0
$F = \{q_3\}$	$*q_3$	q_3	q_3

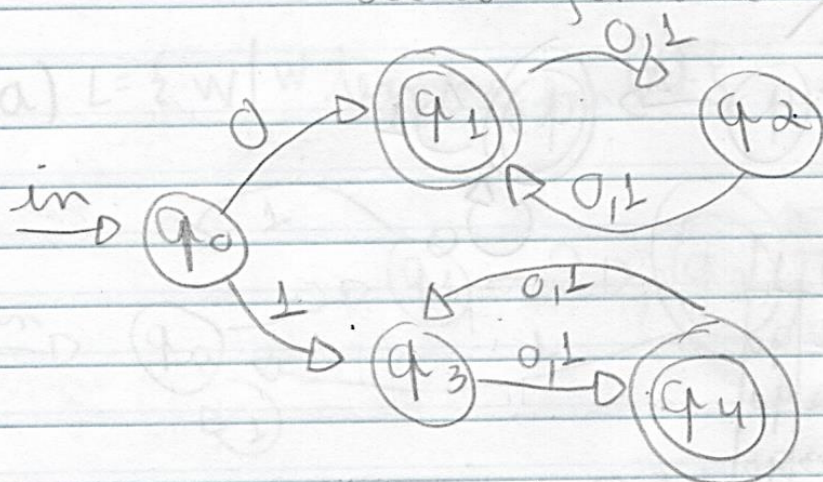
d) $L = \{W \mid W \text{ contém a subcadeia } 0101\}$
 $w = x \cdot 0101 \cdot y$



	δ	0	1
q_0	q_1	q_0	
q_1	q_1	q_2	
q_2	q_3	q_0	
q_3	q_1	q_4	
$*q_4$	q_4	q_4	

$A = \{Q, \Sigma, \delta, q_0, F\}$
 $Q = \{q_0, q_1, q_2, q_3, q_4\}$
 $\Sigma = \{0, 1\}$
 $F = \{q_4\}$

e) $L = \{w \mid w \text{ começa com } 0 \text{ e tem comprimento ímpar, ou começa com } 1 \text{ e tem comprimento par}\}$



δ	0	1
$\rightarrow q_0$	q_1	q_3
* q_1	q_2	q_4
q_2	q_1	q_3
* q_3	q_4	q_3
q_4	q_3	q_3

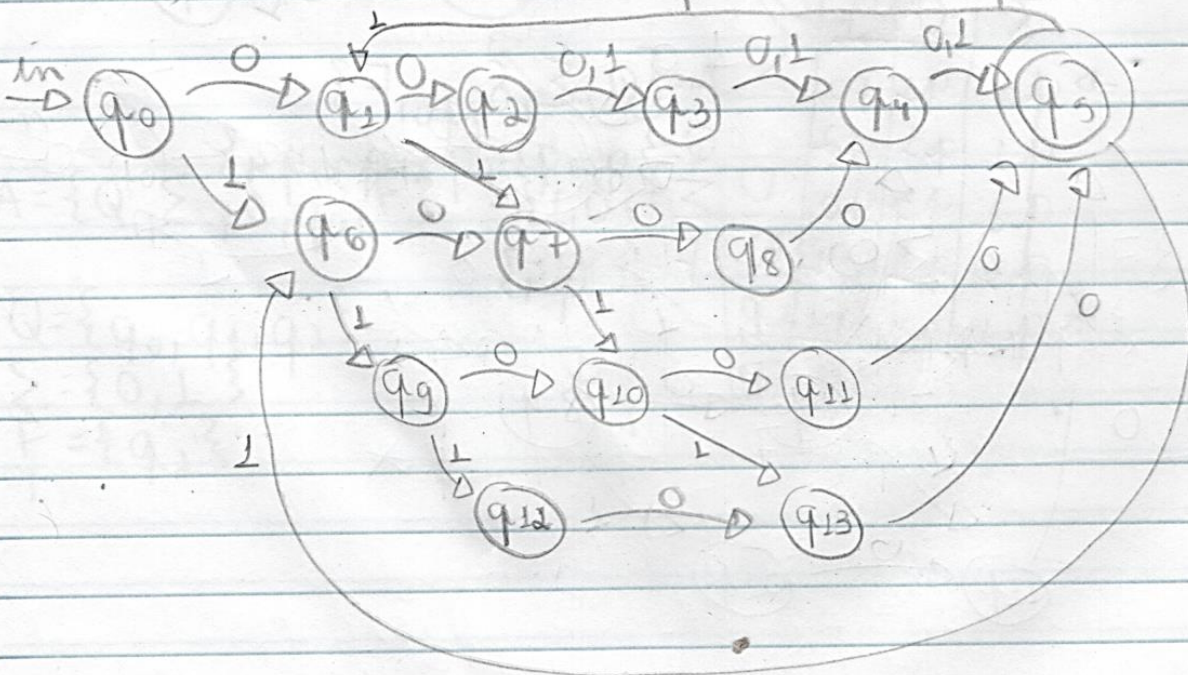
$A = \{Q, \Sigma, \delta, q_0, F\}$

$Q = \{q_0, q_1, q_2, q_3, q_4\}$

$\Sigma = \{0, 1\}$

$F = \{q_1, q_4\}$

f) $L = \{w \mid w \text{ possui um ou mais blocos de cinco símbolos consecutivos que contém pelo menos dois } 0, 1\}$



2.1 f)

$$A = \{Q, \Sigma, \delta, q_0, F\}$$

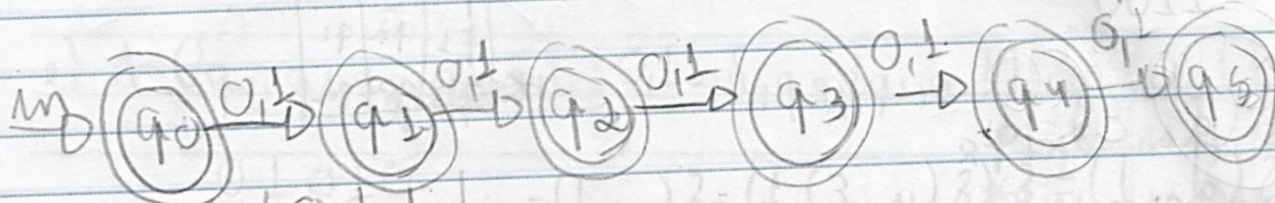
$$Q = \{q_1, q_2, q_3, q_4, q_5, q_6, q_7, q_8, q_9, q_{10}, q_{11}, q_{12}, q_{13}\}$$

$$\Sigma = \{0, 1\}$$

$$F = \{q_5\}$$

δ	0	1
$\rightarrow q_0$	q_1	q_6
q_1	q_2	q_7
q_2	q_3	q_3
q_3	q_4	q_4
q_4	q_5	q_5
* q_5	q_1	q_6
q_6	q_7	q_9
q_7	q_8	q_{10}
q_8	q_4	q_5
q_9	q_{10}	q_{12}
q_{10}	q_{11}	q_{13}
q_{11}	q_5	q_5
q_{12}	q_{13}	q_5
q_{13}	q_5	q_5

g) $L = \{w \mid \text{comprimento de } w \leq 5\}$



δ	0	1
$\rightarrow q_0$	q_1	q_1
$* q_1$	q_2	q_2
$* q_2$	q_3	q_3
$* q_3$	q_4	q_4
$* q_4$	q_5	q_5
$* q_5$	\emptyset	\emptyset

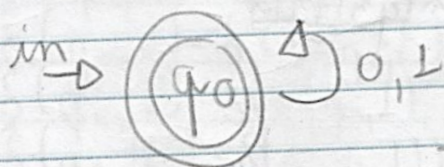
$$A = \{Q, \Sigma, \delta, q_0, F\}$$

$$Q = \{q_0, q_1, q_2, q_3, q_4, q_5\}$$

$$\Sigma = \{0, 1\}$$

$$F = \{q_5\}$$

h) $L = \Sigma^*$



δ	0	1
$\rightarrow q_0$	q_0	q_0

$$A = \{Q, \Sigma, \delta, q_0, F\}$$

$$Q = \{q_0\}$$

$$\Sigma = \{0, 1\}$$

$$F = \{q_0\}$$

e2.2 a) 1100

$$A = (\{q_0, q_1, q_2\}, \{0, 1\}, \delta, q_0, q_2)$$

δ	0	1
$\rightarrow q_0$	q_1	q_0
q_1	q_2	q_0
$* q_2$	q_2	q_0

$$\hat{\delta}(q_0, \epsilon) = q_0$$

$$\hat{\delta}(q_0, 1) = \hat{\delta}(\hat{\delta}(q_0, \epsilon), 1) = \delta(q_0, 1) = q_0$$

$$\hat{\delta}(q_0, 11) = \hat{\delta}(\hat{\delta}(q_0, 1), 1) = \delta(q_0, 1) = q_0$$

$$\hat{\delta}(q_0, 110) = \hat{\delta}(\hat{\delta}(q_0, 11), 0) = \delta(q_0, 0) = q_1$$

$$\hat{\delta}(q_0, 1100) = \hat{\delta}(\hat{\delta}(q_0, 110), 0) = \delta(q_1, 0) = q_2$$

b) $A = (\{q_0, q_1, q_2\}, \{0, 1\}, \delta, q_0, q_2)$

1100

δ	0	1
$\rightarrow q_0$	q_1	q_2
q_1	q_2	q_1
$* q_2$	q_2	q_2

$$\hat{\delta}(q_0, \epsilon) = q_0$$

$$\hat{\delta}(q_0, 1) = \delta(\hat{\delta}(q_0, \epsilon), 1) = \delta(q_0, 1) = q_1$$

$$\hat{\delta}(q_0, 11) = \delta(\hat{\delta}(q_0, 1), 1) = \delta(q_1, 1) = q_1$$

$$\hat{\delta}(q_0, 110) = \delta(\hat{\delta}(q_0, 11), 0) = \delta(q_1, 0) = q_2$$

$$\hat{\delta}(q_0, 1100) = \delta(\hat{\delta}(q_0, 110), 0) = \delta(q_2, 0) = q_2$$

c) $A = (\{q_0, q_1, q_2, q_3\}, \{0, 1\}, \delta, q_0, q_3)$

10001

δ	0	1
$\rightarrow q_0$	q_1	q_0
q_1	q_2	q_0
q_2	q_3	q_0
$* q_3$	q_3	q_3

$$\hat{\delta}(q_0, \epsilon) = q_0$$

$$\hat{\delta}(q_0, 1) = \delta(\hat{\delta}(q_0, \epsilon), 1) = \delta(q_0, 1) = q_0$$

$$\hat{\delta}(q_0, 10) = \delta(\hat{\delta}(q_0, 1), 0) = \delta(q_0, 0) = q_1$$

$$\hat{\delta}(q_0, 100) = \delta(\hat{\delta}(q_0, 10), 0) = \delta(q_1, 0) = q_2$$

$$\hat{\delta}(q_0, 1000) = \delta(\hat{\delta}(q_0, 100), 0) = \delta(q_2, 0) = q_3$$

$$\hat{\delta}(q_0, 10001) = \delta(\hat{\delta}(q_0, 1000), 1) = \delta(q_3, 1) = q_3$$

d) $A = (\{q_0, q_1, q_2, q_3, q_4\}, \{0, 1\}, \delta, q_0, q_4)$

11010100

δ	0	1
$\rightarrow q_0$	q_1	q_0
q_1	q_1	q_2
q_2	q_3	q_0
q_3	q_1	q_4
$* q_4$	q_4	q_4

$$\hat{\delta}(q_0, \epsilon) = q_0$$

$$\hat{\delta}(q_0, 1) = \delta(\hat{\delta}(q_0, \epsilon), 1) = \delta(q_0, 1) = q_0$$

$$\hat{\delta}(q_0, 11) = \delta(\hat{\delta}(q_0, 1), 1) = \delta(q_0, 1) = q_0$$

$$\hat{\delta}(q_0, 110) = \delta(\hat{\delta}(q_0, 11), 0) = \delta(q_0, 0) = q_1$$

$$\hat{\delta}(q_0, 1101) = \delta(\hat{\delta}(q_0, 110), 1) = \delta(q_1, 1) = q_2$$

$$\hat{\delta}(q_0, 11010) = \delta(\hat{\delta}(q_0, 1101), 0) = \delta(q_2, 0) = q_3$$

$$\hat{\delta}(q_0, 110101) = \delta(\hat{\delta}(q_0, 11010), 1) = \delta(q_3, 1) = q_4$$

$$\hat{\delta}(q_0, 1101010) = \delta(\hat{\delta}(q_0, 110101), 0) = \delta(q_4, 0) = q_4$$

$$\hat{\delta}(q_0, 11010100) = \delta(\hat{\delta}(q_0, 1101010), 0) = \delta(q_4, 0) = q_4 = A \quad (2)$$

e) $A = (\{q_0, q_1, q_2, q_3, q_4\}, \{0, 1\}, \delta, q_0, \{q_1, q_4\})$

01010

	0	1
$\rightarrow q_0$	q_1	q_3
* q_1	q_2	q_2
q_2	q_2	q_1
q_3	q_4	q_4
* q_4	q_3	q_3

$$\begin{aligned} \hat{\delta}(q_0, \epsilon) &= q_0 \\ \hat{\delta}(q_0, 0) &= \delta(\hat{\delta}(q_0, \epsilon), 0) = \delta(q_0, 0) = q_1 \\ \hat{\delta}(q_0, 01) &= \delta(\hat{\delta}(q_0, 0), 1) = \delta(q_1, 1) = q_2 \\ \hat{\delta}(q_0, 010) &= \delta(\hat{\delta}(q_0, 01), 0) = \delta(q_2, 0) = q_1 \\ \hat{\delta}(q_0, 0101) &= \delta(\hat{\delta}(q_0, 010), 1) = \delta(q_1, 1) = q_2 \end{aligned}$$

f) $A = (\{q_0, q_1, q_2\}, \{0, 1\}, \delta, q_0, q_2)$

11001

$$\begin{aligned} \hat{\delta}(q_0, \epsilon) &= q_0 \\ \hat{\delta}(q_0, 1) &= \delta(\hat{\delta}(q_0, \epsilon), 1) = \delta(q_0, 1) = q_0 \\ \hat{\delta}(q_0, 11) &= \delta(\hat{\delta}(q_0, 1), 1) = \delta(q_0, 1) = q_0 \\ \hat{\delta}(q_0, 110) &= \delta(\hat{\delta}(q_0, 11), 0) = \delta(q_0, 0) = q_1 \\ \hat{\delta}(q_0, 1100) &= \delta(\hat{\delta}(q_0, 110), 0) = \delta(q_1, 0) = q_1 \\ \hat{\delta}(q_0, 11001) &= \delta(\hat{\delta}(q_0, 1100), 1) = \delta(q_1, 1) = q_2 \end{aligned}$$

g) $A = (\{q_0, q_1, q_2, q_3, q_4, q_5\}, \{0, 1\}, \delta, q_0, \{q_1, q_2, q_3, q_4, q_5\})$

001

	0	1
$\rightarrow q_0$	q_1	q_1
* q_1	q_2	q_2
* q_2	q_3	q_3
* q_3	q_4	q_4
* q_4	q_5	q_5
* q_5	\emptyset	\emptyset

$$\begin{aligned} \hat{\delta}(q_0, \epsilon) &= q_0 \\ \hat{\delta}(q_0, 0) &= \delta(\hat{\delta}(q_0, \epsilon), 0) = \delta(q_0, 0) = q_1 \\ \hat{\delta}(q_0, 00) &= \delta(\hat{\delta}(q_0, 0), 0) = \delta(q_1, 0) = q_2 \\ \hat{\delta}(q_0, 001) &= \delta(\hat{\delta}(q_0, 00), 1) = \delta(q_2, 1) = q_3 \end{aligned}$$

$$2) A = (q_0, \{0, 1\}, \delta, q_0, q_0)$$

$$\delta$$

δ	0	1
q_0	q_0	q_0

1 0 1 0 1

$$\hat{\delta}(q_0, \epsilon) = q_0$$

$$\hat{\delta}(q_0, 1) = \delta(\hat{\delta}(q_0, \epsilon), 1) = \delta(q_0, 1) = q_0$$

$$\hat{\delta}(q_0, 10) = \delta(\hat{\delta}(q_0, 1), 0) = \delta(q_0, 0) = q_0$$

$$\hat{\delta}(q_0, 101) = \delta(\hat{\delta}(q_0, 10), 1) = \delta(q_0, 1) = q_0$$

$$\hat{\delta}(q_0, 1010) = \delta(\hat{\delta}(q_0, 101), 0) = \delta(q_0, 0) = q_0$$

$$\hat{\delta}(q_0, 10101) = \delta(\hat{\delta}(q_0, 1010), 1) = \delta(q_0, 1) = q_0$$

$$c) A = (q_0, q_1, q_2, q_3, q_4, q_5, q_6, q_7, q_8, q_9, q_{10}, q_{11}, q_{12}, q_{13}, q_{14}, q_{15}, q_{16}, q_{17}, q_{18}, q_{19}, q_{20}, q_{21}, q_{22}, q_{23}, q_{24}, q_{25}, q_{26}, q_{27}, q_{28}, q_{29}, q_{30}, q_{31}, q_{32}, q_{33}, q_{34}, q_{35}, q_{36}, q_{37}, q_{38}, q_{39}, q_{40}, q_{41}, q_{42}, q_{43}, q_{44}, q_{45}, q_{46}, q_{47}, q_{48}, q_{49}, q_{50}, q_{51}, q_{52}, q_{53}, q_{54}, q_{55}, q_{56}, q_{57}, q_{58}, q_{59}, q_{60}, q_{61}, q_{62}, q_{63}, q_{64}, q_{65}, q_{66}, q_{67}, q_{68}, q_{69}, q_{70}, q_{71}, q_{72}, q_{73}, q_{74}, q_{75}, q_{76}, q_{77}, q_{78}, q_{79}, q_{80}, q_{81}, q_{82}, q_{83}, q_{84}, q_{85}, q_{86}, q_{87}, q_{88}, q_{89}, q_{90}, q_{91}, q_{92}, q_{93}, q_{94}, q_{95}, q_{96}, q_{97}, q_{98}, q_{99})$$