

Tarea 30

1: Diseñe y escriba las transiciones de una máquina de Turing de dos cintos que permita el reconocimiento de cada uno de los siguientes lenguajes:

a) $L = \{ ww^R \mid w \in \{a, b\}^* \}$ $\begin{matrix} baba \cdot abab & baba \cdot abab \\ baba \cdot abab & \end{matrix}$

$$\delta(q_0, (\sigma, \#)) = \delta(q_0, (\sigma, \sigma), (R, R))$$

$$\delta(q_0, (\#, \#)) = \delta(q_1, (\#, \#), (L, L))$$

$$\delta(q_1, (\sigma, \sigma)) = \delta(q_1, (\sigma, \sigma), (L, S))$$

$$\delta(q_1, (\#, \sigma)) = \delta(q_2, (\#, \sigma), (R, S))$$

$$\delta(q_2, (a, a)) = \delta(q_2, (a, a), (R, L))$$

$$\delta(q_2, (b, b)) = \delta(q_2, (b, b), (R, L))$$

$$\delta(q_2, (\#, \#)) = \delta(q_A, (\#, \#), (S, S))$$

b) $L = \{ ww \mid w \in \{a, b\}^* \}$

$\begin{matrix} abaaba & aabaab \\ \# \# \# \# \# \end{matrix}$

$$\delta(q_0, (a, \#)) = \delta(q_1, (a, \#), (R, R))$$

$$\delta(q_0, (b, \#)) = \delta(q_1, (b, \#), (R, R))$$

$$\delta(q_0, (\#, \#)) = \delta(q_2, (\#, \#), (L, L))$$

$$\delta(q_1, (a, \#)) = \delta(q_0, (a, \#), (R, S))$$

$$\delta(q_1, (b, \#)) = \delta(q_0, (b, \#), (R, S))$$

$$\delta(q_2, (a, a)) = \delta(q_2, (a, a), (L, L))$$

$$\delta(q_2, (b, b)) = \delta(q_2, (b, b), (L, L))$$

$$\delta(q_3, (\sigma, \#)) = \delta(q_4, (\sigma, \#), (L, R))$$

$$\delta(q_4, (\sigma, \sigma)) = \delta(q_4, (\sigma, \sigma), (L, S))$$

$$\delta(q_4, (\#, \sigma)) = \delta(q_5, (\#, \sigma), (R, S))$$

$$\delta(q_5, (a, a)) = \delta(q_5, (a, a), (R, R))$$

$$\delta(q_5, (b, b)) = \delta(q_5, (b, b), (R, R))$$

$$\delta(q_5, (\sigma, \#)) = \delta(q_A, (\sigma, \#), (S, S))$$

$$c) L = \{ w \in \{a,b\}^* \mid N_a(w) = N_b(w) \}$$

$$\delta(q_0, (a, \#)) = (q_0, (a, b), (R, R))$$

$$\delta(q_0, (b, \#)) = (q_0, (b, \#), (R, S))$$

$$\delta(q_0, (\#, \#)) = (q_1, (\#, \#), (L, L))$$

$$\delta(q_1, (b, b)) = (q_1, (b, b), (L, L))$$

$$\delta(q_1, (a, b)) = (q_1, (a, b), (L, S))$$

$$\delta(q_1, (\#, \#)) = (q_1, (\#, \#), (S, S))$$

$aababbb$
 ba
 $aababbb$
 $bbbbb$
 $bbabab$
 bb $aabbb$
 bb

2.- Diseñe y escriba las transiciones de una máquina de Turing de dos cintas que realice cada una de las siguientes funciones dejando la respuesta en la misma cinta de entrada:

a).- Duplique una cadena, es decir, dado $w \in \{a,b\}^*$, escriba ww

$$\delta(q_0, (a, \#)) = (q_0, (a, a), (R, R))$$

$$\delta(q_0, (b, \#)) = (q_0, (b, b), (R, R))$$

$$\delta(q_0, (\#, \#)) = (q_1, (\#, \#), (S, L))$$

$$\delta(q_1, (\#, \sigma)) = (q_1, (\#, \sigma), (S, L))$$

$$\delta(q_1, (\#, \#)) = (q_2, (\#, \#), (S, R))$$

$$\delta(q_2, (\#, a)) = (q_2, (a, a), (R, R))$$

$$\delta(q_2, (\#, b)) = (q_2, (b, b), (R, R))$$

$$\delta(q_2, (\#, \#)) = (q_1, (\#, \#), (S, S))$$

b) Invierta una cadena, es decir, dado $w \in \{a,b\}^*$, escriba w^R .

$$\delta(q_0, (a, \#)) = (q_0, (a, a), (R, R))$$

$$\delta(q_0, (b, \#)) = (q_0, (b, b), (R, R))$$

$$\delta(q_0, (\#, \#)) = (q_1, (\#, \#), (L, S))$$

$$\delta(q_1, (\sigma, \#)) = (q_1, (\sigma, \#), (L, S))$$

$$\delta(q_1, (\#, \#)) = (q_2, (\#, \#), (R, L))$$

$$\delta(q_2, (\sigma, a)) = (q_2, (a, a), (R, L))$$

$$\delta(q_2, (\sigma, b)) = (q_2, (b, b), (R, L))$$

$$\delta(q_2, (\#, \#)) = (q_2, (\#, \#), (S, S))$$

c) Cuente la cantidad de 'a's que hay en una cadena, es decir, dado $w \in \{a,b\}^*$, escriba $x = 1^n$, donde $n = N_a(w)$ es la cantidad de 'a's en w .

$$\delta(q_0, (a, \#)) = (q_0, (a, a), (R, R))$$

$$\delta(q_0, (b, \#)) = (q_0, (b, b), (R, R))$$

$$\delta(q_0, (\#, \#)) = (q_1, (\#, \#), (L, L))$$

$$\delta(q_1, (\sigma, a)) = (q_1, (1, a), (L, L))$$

$$\delta(q_1, (\sigma, b)) = (q_1, (\sigma, b), (S, L))$$

$$\delta(q_1, (\sigma, \#)) = (q_2, (\sigma, \#), (S, S))$$

$$\delta(q_1, (\#, \#)) = (q_4, (\#, \#), (S, S))$$

$$\delta(q_2, (\sigma, \#)) = (q_2, (\#, \#), (L, S))$$

$$\delta(q_2, (\#, \#)) = (q_4, (\#, \#), (S, S))$$

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abab
111

qab
qab
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111
111
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