$EQUIVALENCIA\ ENTRE\ AFN-\varepsilon\ Y\ AFN$

$TEOREMA.$ *Si L es aceptado por un $AFN-\varepsilon$, entonces L es aceptado por un AFN sin transiciones ε.*

Sea $M=\left(Q,\ \Sigma,\ \delta,\ q_0,\ F\right)$ *un* $AFN-\varepsilon$. *Se construye* $M'=\left(Q,\ \Sigma,\ \delta',\ q_0,\ F'\right)$ *como sigue :*

$$F'=\begin{cases} F\cup\{q_0\}\ si\ \varepsilon-c(q_0)\cap F\neq\varnothing \\ F\ en\ otro\ caso \end{cases}$$

$$\delta'(q,a)=\delta^*(q,a);\quad q\in Q,\ a\in\Sigma$$

$$\delta'(q_0,\omega a)=\delta'\left(\delta'(q_0,\omega),a\right)$$

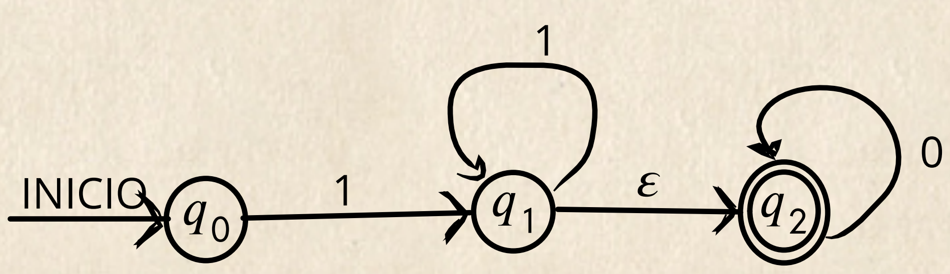
$$\delta'(q_0,\omega)=\delta^*(q_0,\omega)$$

$$\delta'(P,a)=\delta^*(q_0,\omega a)$$

$$\delta'(P,a)=\cup\,\delta'(q,a)=\cup\,\delta^*(q,a);\qquad q\in Q$$

$$\cup\,\delta^*(q,a)=\delta^*(q_0,\omega a);\qquad q\in P$$

EJEMPLO: *Convertir el $AFN-\varepsilon$ de la imagen, en un AFN sin ε*



Cerradura Epsilon de cada estado

$$\varepsilon-c(q_0)=\{q_0\}=\delta^*(q_0,\varepsilon)$$

$$\varepsilon-c(q_1)=\{q_1,q_2\}=\delta^*(q_1,\varepsilon)$$

$$\varepsilon-c(q_2)=\{q_2\}=\delta^*(q_2,\varepsilon)$$

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

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

$F=\{q_2\}$

	ENTRADAS			
ESTADOS	0	1	ε	
q_0	$\varnothing$	$\{q_1\}$	$\varnothing$	0
q_1	$\varnothing$	$\{q_1\}$	$\{q_2\}$	0
q_2	$\{q_2\}$	$\varnothing$	$\varnothing$	1

1. Obtener estados finales

$$\varepsilon-c(q_0)\cap F=\{q_0\}\cap\{q_2\}=\varnothing \leftarrow \boxed{Debido\ a\ que\ es\ \varnothing\ entonces\ F'=F=\{q_2\}}$$

2. Obtener la tabla de transiciones

$$\delta'(q_i,0)=\delta^*(q_i,0)\ para\ i=1,2,3,\ldots.$$

$$\delta'(q_i,1)=\delta^*(q_i,1)\ para\ i=1,2,3,\ \ldots$$

$$\delta'(q_0,0)=\delta^*(q_0,0)=\varepsilon-c\left(\delta\left(\delta^*(q_0,\varepsilon),0\right)\right)=\varepsilon-c\left(\delta(\{q_0\},0)\right)=\varepsilon-c(\varnothing)=\varnothing$$

$$\delta'(q_0,1)=\delta^*(q_0,1)=\varepsilon-c\left(\delta\left(\delta^*(q_0,\varepsilon),1\right)\right)=\varepsilon-c\left(\delta(\{q_0\},1)\right)=\varepsilon-c(\{q_1\})=\{q_1,q_2\}$$

$$\delta'(q_1,0)=\delta^*(q_1,0)=\varepsilon-c\left(\delta\left(\delta^*(q_1,\varepsilon),0\right)\right)=\varepsilon-c\left(\delta(\{q_1,q_2\},0)\right)=\varepsilon-c(\varnothing\cup\{q_2\})=\varepsilon-c(\{q_2\})=\{q_2\}$$

$$\delta'(q_1,1)=\delta^*(q_1,1)=\varepsilon-c\left(\delta\left(\delta^*(q_1,\varepsilon),1\right)\right)=\varepsilon-c\left(\delta(\{q_1,q_2\},1)\right)=\varepsilon-c(\{q_1\}\cup\varnothing)=\varepsilon-c(\{q_1\})=\{q_1,q_2\}$$

$$\delta'(q_2,0)=\delta^*(q_2,0)=\varepsilon-c\left(\delta\left(\delta^*(q_2,\varepsilon),0\right)\right)=\varepsilon-c\left(\delta(\{q_2\},0)\right)=\varepsilon-c(\{q_2\})=\{q_2\}$$

$$\delta'(q_2,1)=\delta^*(q_2,1)=\varepsilon-c\left(\delta\left(\delta^*(q_2,\varepsilon),1\right)\right)=\varepsilon-c\left(\delta(\{q_2\},1)\right)=\varepsilon-c(\varnothing)=\varnothing$$

δ' :

	ENTRADAS	
ESTADOS	0	1
q_0	$\varnothing$	$\{q_1,q_2\}$
q_1	$\{q_2\}$	$\{q_1,q_2\}$
q_2	$\{q_2\}$	$\varnothing$