02

PDF

$\{a,b\}^+ = \{a,b,ab,\ldots\}$

1

1.

$q_0 = \{w \mid w \in (ab)^\star\}$
$q_1 = \{wa \mid w \in (ab)^\star\}$
$q_2 = \{waa \mid w \in (ab)^\star\}$

$q_3 = \{waa\{a,b\} \mid w \in (ab)^\star\} \cup \{bw \mid w \in \{a,b\}^\star\}$

$\forall w \in \{a,b\}^\star . \hat{\delta}(q_0,w) = q_0 \iff B_0(w) : w \in \{(ab)^n \mid n \geq 0\}$

$\forall w \in \{a,b\}^\star . \hat{\delta}(q_0,w) = q_1 \iff B_1(w) : w \in \{(ab)^n a \mid n \geq 0\}$

$\forall w \in \{a,b\}^\star . \hat{\delta}(q_0,w) = q_2 \iff B_0(w) : w \in \{(ab)^n aa \mid n \geq 0\}$

$\forall w \in \{a,b\}^\star . \hat{\delta}(q_0,w) = q_3 \iff B_3(w) : \neg B_0(w) \wedge \neg B_1(w) \wedge \neg B_2(w)$

2.

$B_0(w)$: Sei $w = \varepsilon$, dann gilt:
$\hat{\delta}(q_0,\varepsilon) = q_0 \iff \exists n \in \mathbb{N} : (ab)^n = \varepsilon$

Linke Seite gilt laut def von $\hat{\delta}$. Rechts gilt für $n = 0$. Damit sind beide Seiten der Äquivalenz gleich.

$B_1(w)$: Sei $w = \varepsilon$, dann gilt:
$\hat{\delta}(q_0,\varepsilon) = q_1 \iff \exists n \in \mathbb{N} : (ab)^n a = \varepsilon$

3.

4.

$$
\begin{aligned}
& \hat{\delta}(q_0, w'x) = q_0 \\
\iff \quad & \hat{\delta}(q_0, w') = q_1 \wedge x = b \\
\iff \quad & \exists n \geq 0 . (ab)^n a = w' \wedge x = b \\
\iff \quad & \exists n \geq 0 . (ab)^n ab = w'x \\
\iff \quad & \exists n \geq 0 . (ab)^n = w
\end{aligned}
$$

2

1.

$F = \{q_2\}$

100

$$
\begin{array}{rcccc}
\hat{\delta}(q_0, \epsilon) & = & \{q_0\} & & \\
\hat{\delta}(q_0, 1) & = & \{q_0\} & & \\
\hat{\delta}(q_0, 10) & = & \delta(q_0, 0) \cup \delta(q_0, 1) & = & \{q_0, q_1\} \\
\hat{\delta}(q_0, 100) & = & \delta(q_0, 0) \cup \delta(q_0, 1) & = & \{q_0, q_1\}
\end{array}
$$

$\{q_0, q_1\} \cap F = \emptyset$

1011

$$
\begin{array}{rcccc}
\hat{\delta}(q_0, \epsilon) & = & \{q_0\} & & \\
\hat{\delta}(q_0, 1) & = & \{q_0\} & & \\
\hat{\delta}(q_0, 10) & = & \delta(q_0, 0) \cup \delta(q_0, 1) & = & \{q_0, q_1\} \\
\hat{\delta}(q_0, 101) & = & \delta(q_0, 0) \cup \delta(q_0, 1) & = & \{q_0, q_1\} \\
\hat{\delta}(q_0, 1011) & = & \delta(q_0, 0) \cup \delta(q_0, 1) & = & \{q_0, q_1\}
\end{array}
$$

$\{q_0, q_1\} \cap F = \emptyset$

2.

$L(B) = \{w01^n \mid n \geq 1. w \in \{0,1\}^\star\}$
$L((0+1)^\star 01^+)$