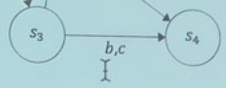


5.1 $L(A_1) = \{ a^n \mid n \in \mathbb{N}_0 \} = L(a^*)$

$L(A_2) = \{ aw \mid w \in \{a,b\}^* \} \cup \{ b\, b^n a w \mid n \in \mathbb{N}_0,\ w \in \{a,b\}^* \}$ $= L(a(a|b)^*) \cup L(b^+ a (a|b)^*) = L((\varepsilon | b^+) a (a|b)^*)$

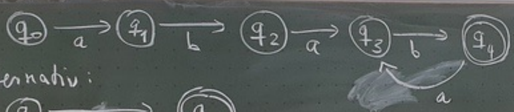
$L(A_3) = \emptyset$

$L(A_4) = \{ x\, a^{2n} c\, b^m \mid x \in \{a,b,c\},\ m,n \in \mathbb{N}_0 \} = L((a|b|c)(aa)^* c\, b^*)$

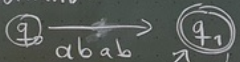
der die Sprache $L_2 = \{(ab)^n x (ba)^m \mid n,m \in \mathbb{N}\}$ erkennt. (Zur Erinnerung: $0 \notin \mathbb{N}$, denn $\mathbb{N} = \{1,2,3,\dots\}$ und $\mathbb{N}_0 = \{0,1,2,\dots\}$.)

3. Welches Problem entsteht, wenn Sie bei der obigen Aufgabe verlangen, dass immer $n = m$ gilt, also für die Sprache $L_3 = \{(ab)^n x (ba)^n \mid n \in \mathbb{N}\} = \{abxba, ababxbaba, abababxbababa, \dots\}$?

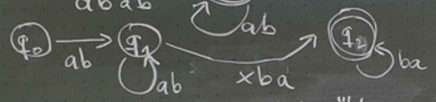
5.2 a)



alternativ:

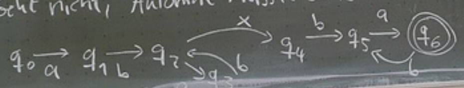


b)



c) Geht nicht, Automat müsste zählen.

b')



Formal:

$A_2 = (\Sigma, S, \delta: S \times \Sigma \to S, s_0, F)$

mit $\Sigma = \{a, b, x\}$, $S = \{q_0, \dots, q_6\}$, $F = \{q_6\}$

$s_0 = q_0$ und δ:

δ	q_0	q_1	q_2	q_3	q_4	q_5	q_6
a	q_1	–	q_3	–	–	q_6	–
b	–	q_2	–	q_2	q_5	–	q_5
x	–	–	q_4	–	–	–	–

5.1 $L(A_1) = \{ a^n \mid n \in \mathbb{N}_0 \} = L(a^*)$

$L(A_2) = \{ aw \mid w \in \{a,b\}^* \}$ $= L(a(a|b)^*) \cup L(b^+ a (a|b)^*)$

$S = Pot(\{s_0, s_1, s_2, s_3\})$

$= \{ \emptyset,$
$\{s_0\}, \{s_1\}, \{s_2\}, \{s_3\},$
$\{s_0,s_1\}, \{s_0,s_2\}, \{s_0,s_3\}, \{s_1,s_2\}, \{s_1,s_3\}, \{s_2,s_3\},$
$\{s_0,s_1,s_2\}, \{s_0,s_1,s_3\}, \{s_0,s_2,s_3\}, \{s_1,s_2,s_3\},$
$\{s_0,s_1,s_2,s_3\} \}$

$= \{ 0000,$
$1000, 0100, 0010, 0001,$
$1100, 1010, 1001, 0110, 0101, 0011,$
$1110, 1101, 1011, 0111,$
$1111 \}$, $2^4 = 16$

$Pot(Q) = 2^Q$

5.3 $\delta^*(s, \varepsilon) = s$

$\delta^*(s, aw) = \delta^*(\delta(s,a), w)$

δ' ist nur eine andere Schreibweise

Vgl.: $\sum_{i=1}^{n} a_i = \begin{cases} 0, & n = 0 \\ a_n + \sum_{i=1}^{n-1} a_i, & n > 0 \end{cases}$

$\sum_{i=1}^{n} a_i = a_1 + a_2 + \dots a_{n-1} + a_n,\ n \geq 1$

5.4 Potenzmengenkonstruktion