

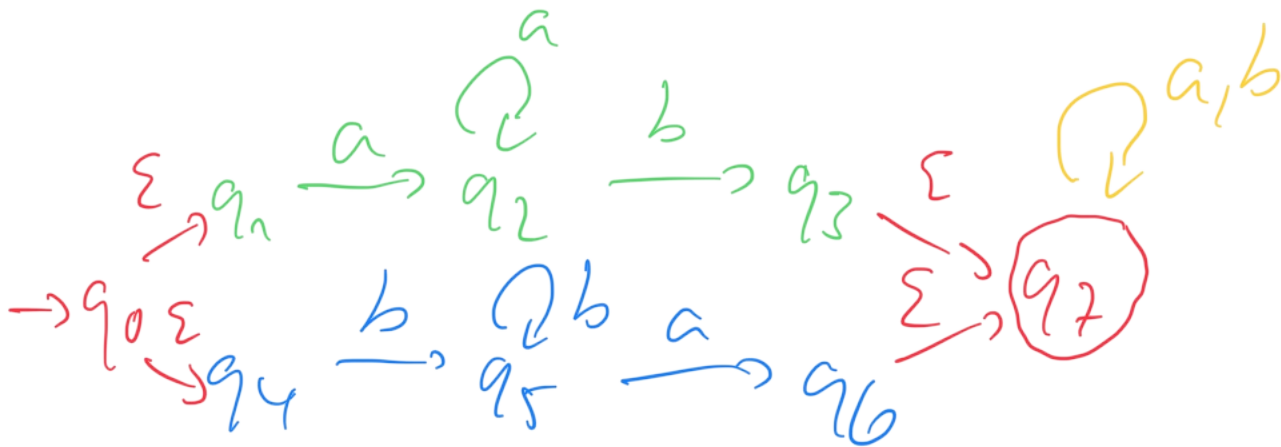
A: "Toolchain"

Task: Construct a DFA accepting the language

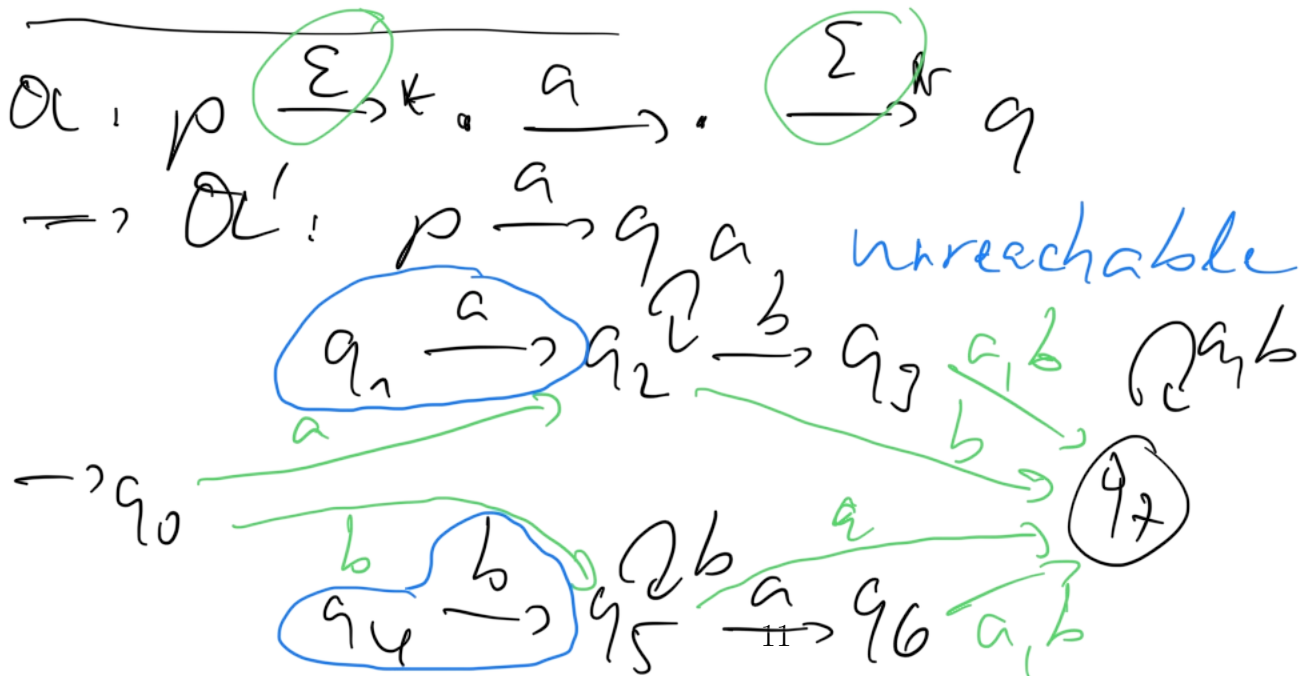
$$L = \{w \in \{a, b\}^* \mid w \text{ contains at least one } a \text{ and at least one } b\}.$$

"first a, then b": $(a/b)^* a (a/b)^* b (a/b)^*$
Reg. expr: $(a^+ b \mid b^+ a) (a/b)^*$
 $\Rightarrow abba \notin L(x) \hookrightarrow a^+ b^+$

Σ -NFA:



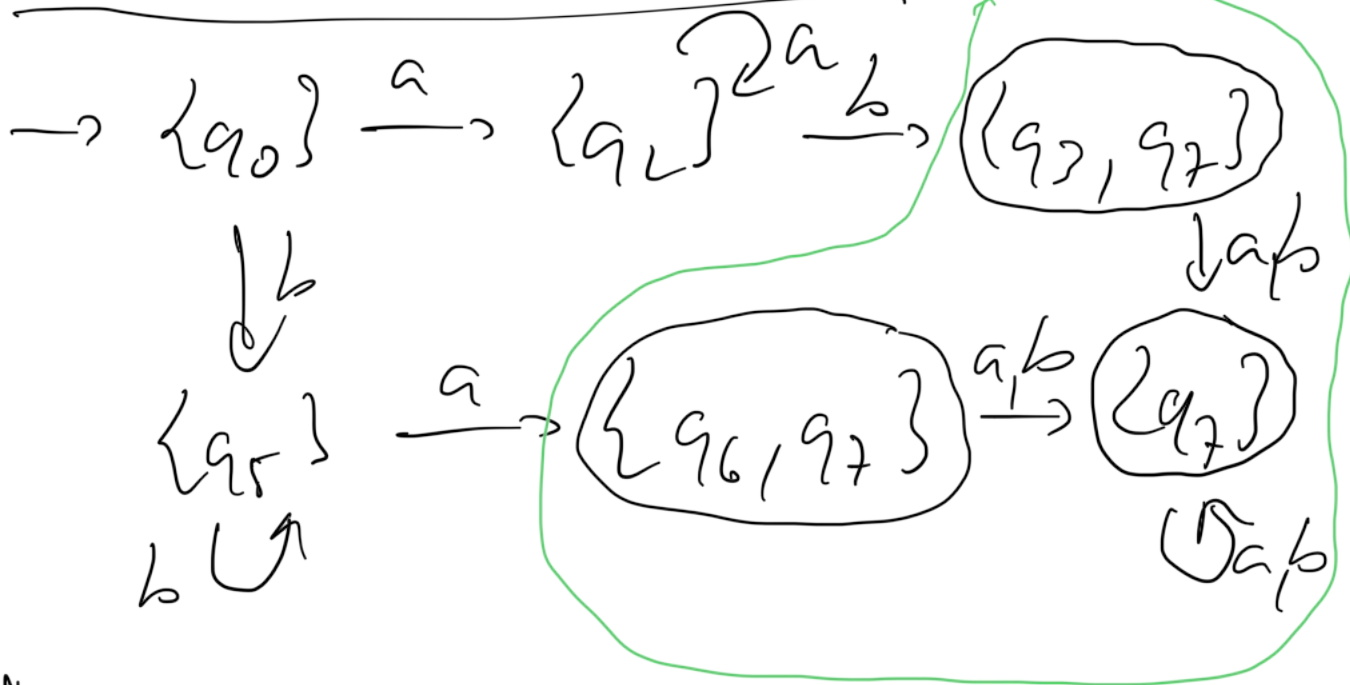
Σ -elimination:



A: "Toolchain"

Task: Construct a DFA accepting the language described by $\alpha = (ab^*)^*$.

Power set construction:



Minimisation:

For DFA $D = (Q, \Sigma, \delta, q_0, F)$:

p, q are equivalent iff

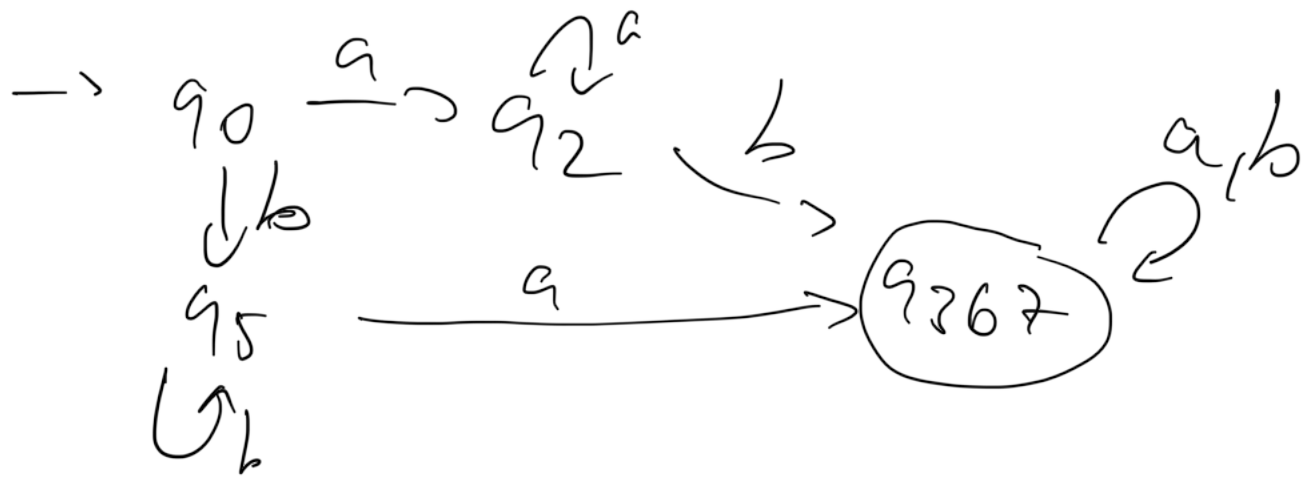
$\forall w \in \Sigma^*, \delta^*(p, w) \in F$

$\Leftrightarrow \delta^*(q, w) \in F$

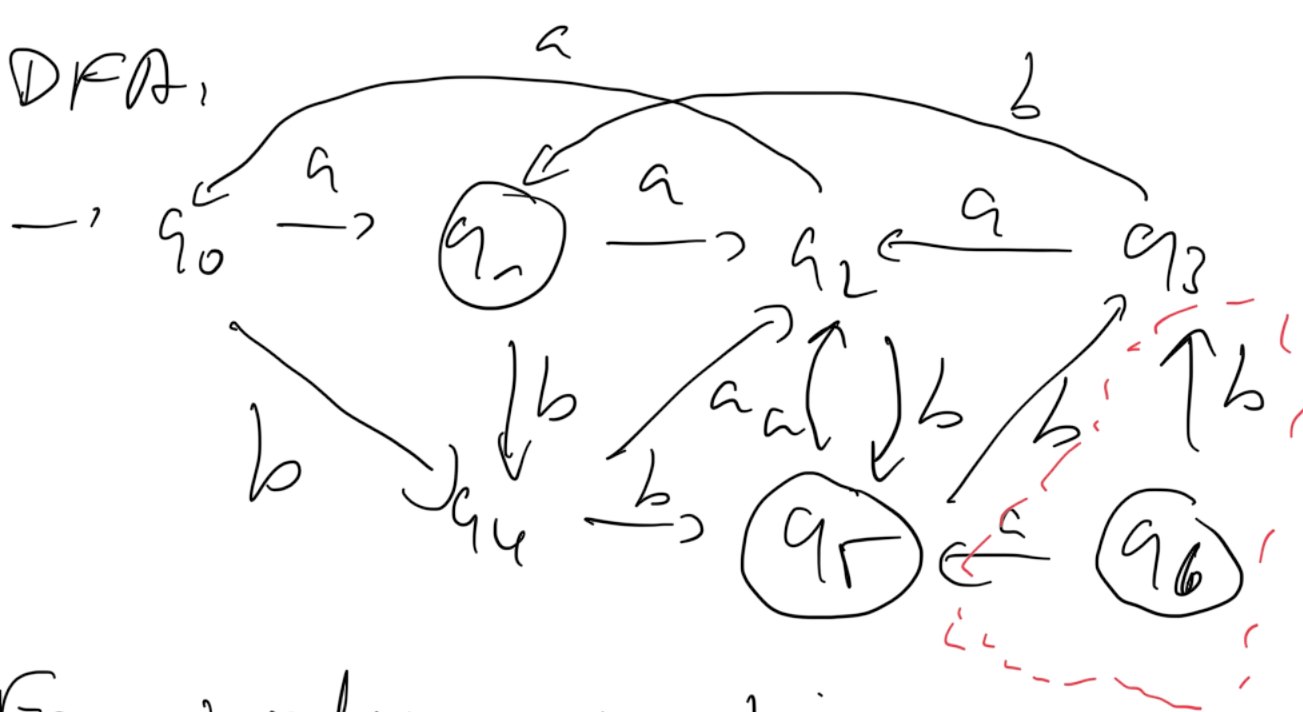
	q_0	q_2	q_5	q_{37}	q_{67}	q_7
q_0		b	a	Σ	Σ	Σ
q_2			a	Σ	Σ	Σ
q_5				Σ	Σ	Σ
q_{37}					/	/
q_{67}						/
q_7						

$\Rightarrow q_{37}, q_{67}, q_7$
equivalent

Minimised automaton:



DFA,



Equivalence matrix:

	q ₀	q ₁	q ₂	q ₃	q ₄	q ₅	q ₆
q ₀		Σ	a/b	a	a	Σ	Σ
q ₁			Σ	Σ	Σ	○	a
q ₂				aa	ab	Σ	Σ
q ₃					○	Σ	Σ
q ₄						Σ	Σ
q ₅							a
q ₆							

$q_2 \xrightarrow{a} q_0$
 $q_3 \xrightarrow{a} q_2$

← distinguished by a/b
 $\Rightarrow q_2, q_3$ can be distinguished by aa/ab

$\Rightarrow q_1, q_5$ equiv.
 q_3, q_4 equiv.

Minimised automaton:

