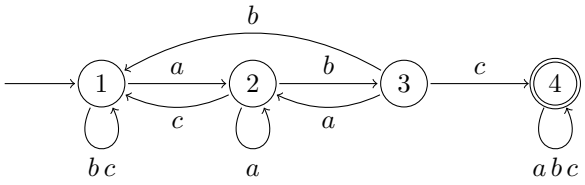
universität innsbruck

Automata and Logic	26W	LVA 703302 + 703303
Lecture 1		October 9, 2026

Selected Solutions

1 (a)



4 (a) We adapt the product construction on slide 26: Let $A = L(M_1)$ for the DFA $M_1 = (Q_1, \Sigma, \delta_1, s_1, F_1)$ and $B = L(M_2)$ for the DFA $M_2 = (Q_2, \Sigma, \delta_2, s_2, F_2)$. We have $A - B = L(M_3)$ for the DFA $M_3 = (Q_3, \Sigma, \delta_3, s_3, F_3)$ with

- $Q_3 = Q_1 \times Q_2$,
- $F_3 = F_1 \times (Q_2 - F_2)$,
- $s_3 = (s_1, s_2)$,
- $\delta_3((p, q), a) = (\delta_1(p, a), \delta_2(q, a))$ for all $p \in Q_1$, $q \in Q_2$ and $a \in \Sigma$.

Alternatively we can use the fact that $A - B = A \cap \sim B$ together with the closure properties given on slides.

(b) Using the construction above we obtain the DFA M:

		a	b
$\rightarrow$	$(1,1)$	$(1,2)$	$(2,3)$
	$(1,2)$	$(1,3)$	$(2,1)$
	$(1,3)$	$(1,2)$	$(2,1)$
	$(2,1)F$	$(1,2)$	$(2,3)$
	$(2,2)$	$(1,3)$	$(2,1)$
	$(2,3)F$	$(1,2)$	$(2,1)$