

## Exercises (Regular Languages)

### A2: Construction of Deterministic Finite Automata

**Task:** Construct a DFA over  $\Sigma := \{a, b\}$  that accepts the following language:

$$\{w \in \Sigma^* \mid \text{each } a \text{ followed by exactly 1 or 3 } b\text{'s}\}$$

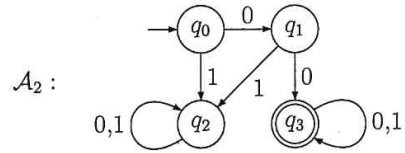
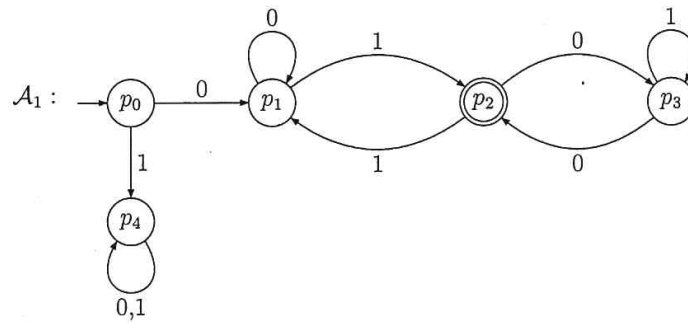
## A2: Construction of Deterministic Finite Automata

**Task:** Construct a DFA over  $\Sigma := \{0, 1\}$  that accepts the following language:

$$\{w \in \Sigma^* \mid \text{decimal value of } w \text{ divisible by } 4\}$$

### A3: Operations on Automata

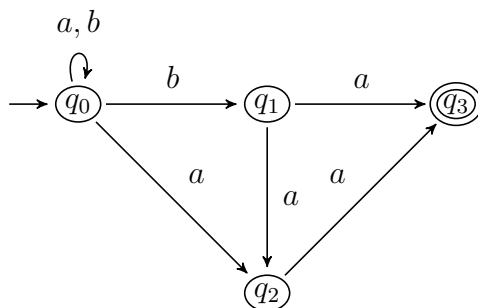
**Task:** Let  $\mathcal{A}_1$  and  $\mathcal{A}_2$  be the following automata over  $\Sigma = \{0, 1\}$ :



Construct two automata that respectively recognise the intersection and the union of the languages accepted by  $\mathcal{A}_1$  and  $\mathcal{A}_2$ .

## A4: Nondeterministic Finite Automata

**Task:** Let  $\mathfrak{A}$  be the following NFA over  $\Sigma := \{a, b\}$ .



Determine the reachability sets  $R_{\mathfrak{A}}(\varepsilon)$ ,  $R_{\mathfrak{A}}(b)$ ,  $R_{\mathfrak{A}}(ba)$ , and  $R_{\mathfrak{A}}(baa)$ .

## A5: Powerset Construction

**Task:** Apply the powerset construction to transform the following NFA  $\mathcal{A}$  over  $\Sigma := \{a, b, c\}$  into an equivalent DFA.

