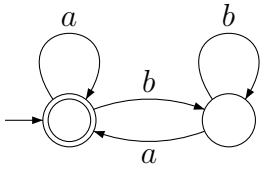
Exercises

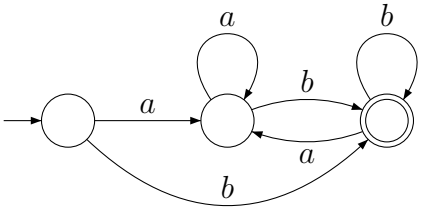
Exercise 1

Given the following automata:

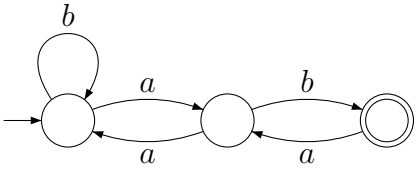
A_1



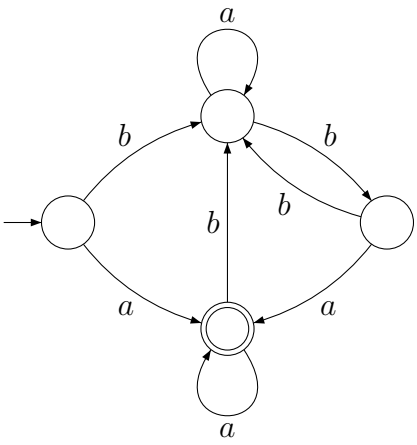
A_2



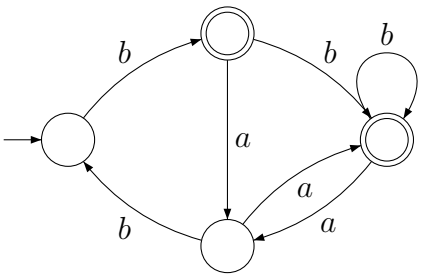
A_3



A_4



A_5



(a) Obtain a DFA for $\overline{L(A_1)}$

(b) Obtain a DFA for $\overline{L(A_3)}$

(c) Obtain a DFA for $L(A_1) \cup L(A_2)$

(d) Obtain a DFA for $L(A_1) \cap L(A_2)$

(e) Obtain a DFA for $L(A_2) \cup L(A_3)$

(f) Obtain a DFA for $L(A_2) \cap L(A_3)$

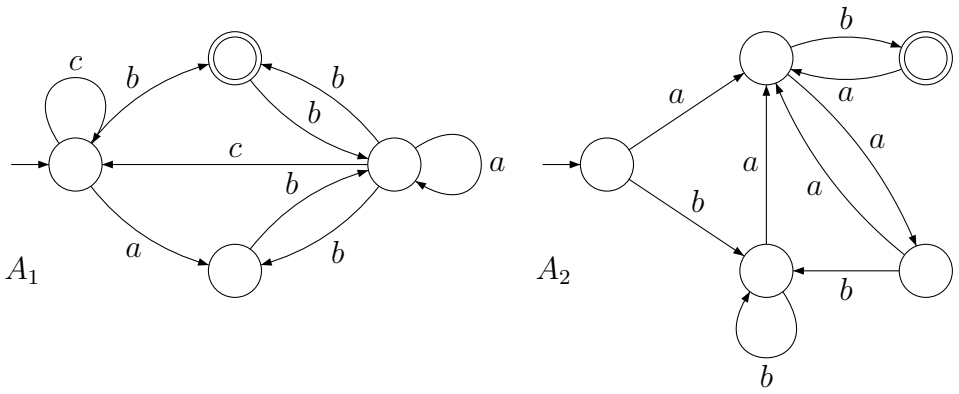
(g) Obtain a DFA for $L(A_2) - L(A_3)$

(h) Obtain a DFA for $(abba)^{-1}L(A_4)$

(i) Obtain a DFA for the language $(bbbab)^{-1}L(A_5)$

Exercise 2

Given the automata:



and the following homomorphisms:

$$h:\{a,b,c\} \to \{0,1,2\}^* \quad \begin{cases} h(a) = 00 \\ h(b) = 1 \\ h(c) = \lambda \end{cases}$$

$$g:\{0,1,2\} \to \{a,b,c\}^* \quad \begin{cases} g(0) = ab \\ g(1) = bbb \\ g(2) = a \end{cases}$$

$$f:\{0,1,2\} \to \{a,b\}^* \quad \begin{cases} f(0) = ab \\ f(1) = bab \\ f(2) = \lambda \end{cases}$$

(a) Obtain a DFA for the language $g^{-1}(L(A_1))$

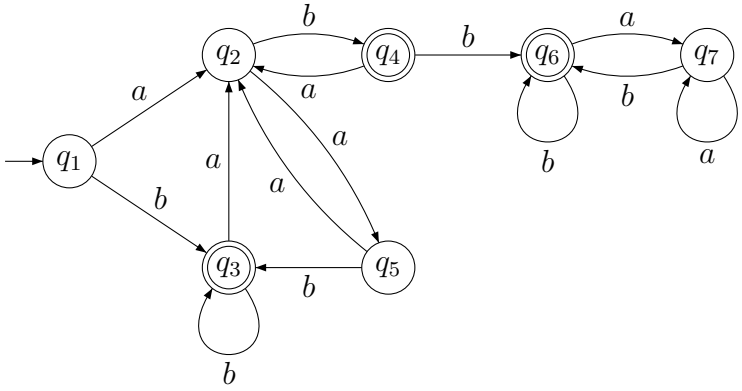
(b) Obtain a DFA for $f^{-1}(L(A_2))$

(c) Obtain a DFA for the language $h^{-1}(f^{-1}(L(A_2)))$

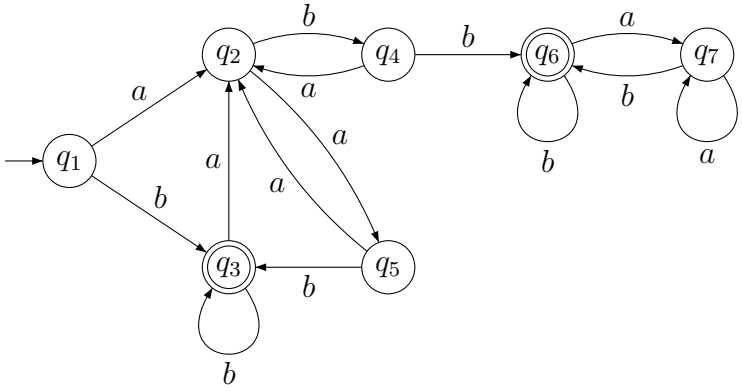
Exercise 3

For each one of the following automata, obtain the minimal equivalent DFA:

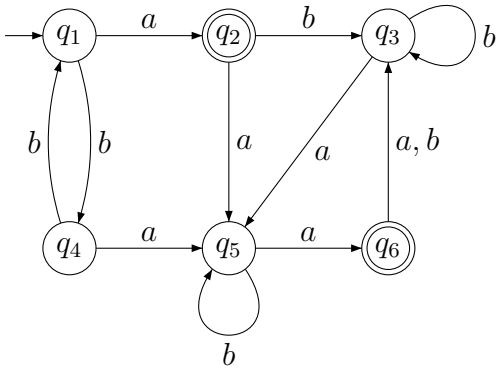
(a)



(b)



(c)



(d)