Lab #4 : DFA Minimisation

Exercise 1

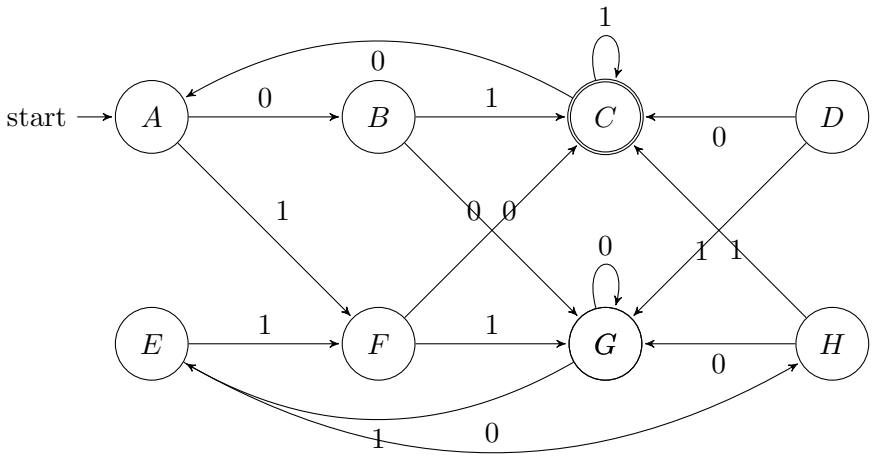
Let M be the DFA $M = (\Sigma, Q, \delta, q_0, F)$ with $\Sigma = \{a, b\}$, $Q = \{q_0, q_1, q_2, q_3, q_4, q_5, q_6\}$, $F = \{q_3, q_4, q_5, q_6\}$ and δ defined by the following table:

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

- minimise M
- what is the language accepted by the minimized DFA obtained?

Exercise 2

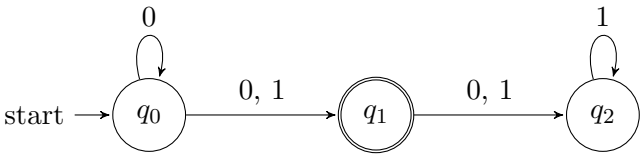
Let M be the following DFA over $\{0, 1\}^*$:



Minimize M and draw the obtained DFA.

Exercise 3

Let N be the following NFA over $\{0,1\}^*$:



- give a complete DFA M which accepts the same language
- convert N to a DFA M' using the NFA-to-DFA algorithm reviewed in class
- minimize M' and compare the resulting DFA to N

Exercise 4

Let N be the NFA $M = (\Sigma, Q, \delta, 0, F)$ with $\Sigma = \{a, b\}$, $Q = \{0, 1, 2, 3\}$, $F = \{2\}$ and δ defined by the following table:

δ	a	b
0	1	3
1	-	$\{0, 2\}$
2	0	-
3	0	-

N is not complete because some transitions are missing.

- complete the NFA N to get N' a corresponding complete NFA, then build a DFA for the same language using the NFA-to-DFA algorithm, and finally minimize the DFA you get
- build directly a DFA for the same language using the NFA-to-DFA algorithm, complete it if it's not complete and finally minimize it
- compare the two DFA's you've got in the two previous questions