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## Exercise 2.1

We did the tutorial, but are so kind to only upload the pdf without all the .jff files ;)

## Exercise 2.2

(a) This is the graphical representation of the DFA $M = \langle \{ q_0, q_1, q_2, q_3 \}, \{ a, b \}, \delta, q_0, \{ q_2 \} \rangle$.

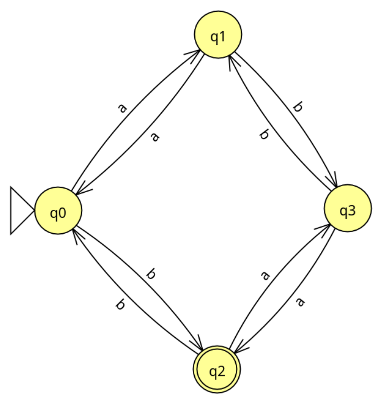


Figure 1: Graphical representation of DFA $M$

(b) For the sequence "abbab", we visit the following states:

$$q_0 \rightarrow q_1 \rightarrow q_3 \rightarrow q_1 \rightarrow q_0 \rightarrow q_2$$

As you can see, we end up at $q_2$ which is actually one, and the only, final state of the DFA $M$.

(c) $M$ recognizes every language that has an odd number of "b"'s in it (at least one) and that has 0 or an even number of "a"'s. So the minimal length of the words of the language has to be 1, since you have to reach $q_2$ from $q_0$.

## Exercise 2.3

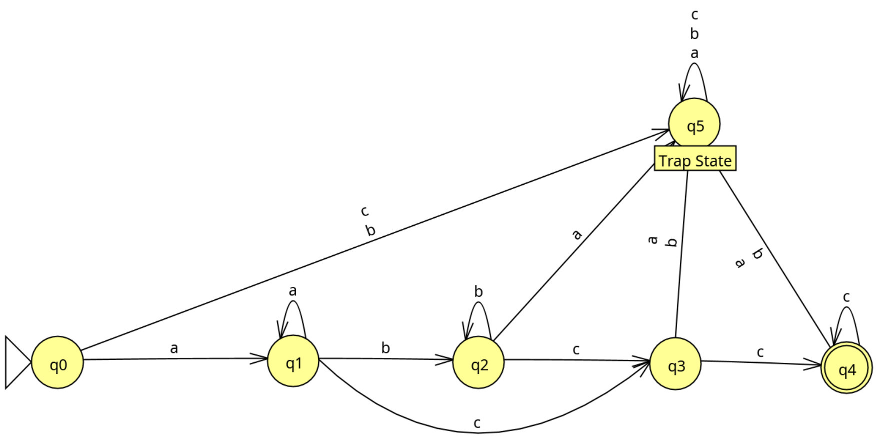


Figure 2: The DFA for the language $L = \{ a^x \, b^y \, c^z \mid x \geq 1, \ y \geq 0, \ z \geq 2 \}$

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## Exercise 2.4

(a) Yes, because if we follow the states given by the word 0101010 we end up at $q_2$, which is a final state of the NFA.

After the first 0 we end up at $q_2$, from which we can go back to $q_0$ (with $\epsilon$) and then go to $q_1$ with 1. The following elements 010 we do by staying on $q_1$; then we go to $q_2$ with 1 and we end on $q_2$ with the last 0 passing by $q_0$.

(b) This is the DFA equivalent to the NFA on the Exercise sheet:

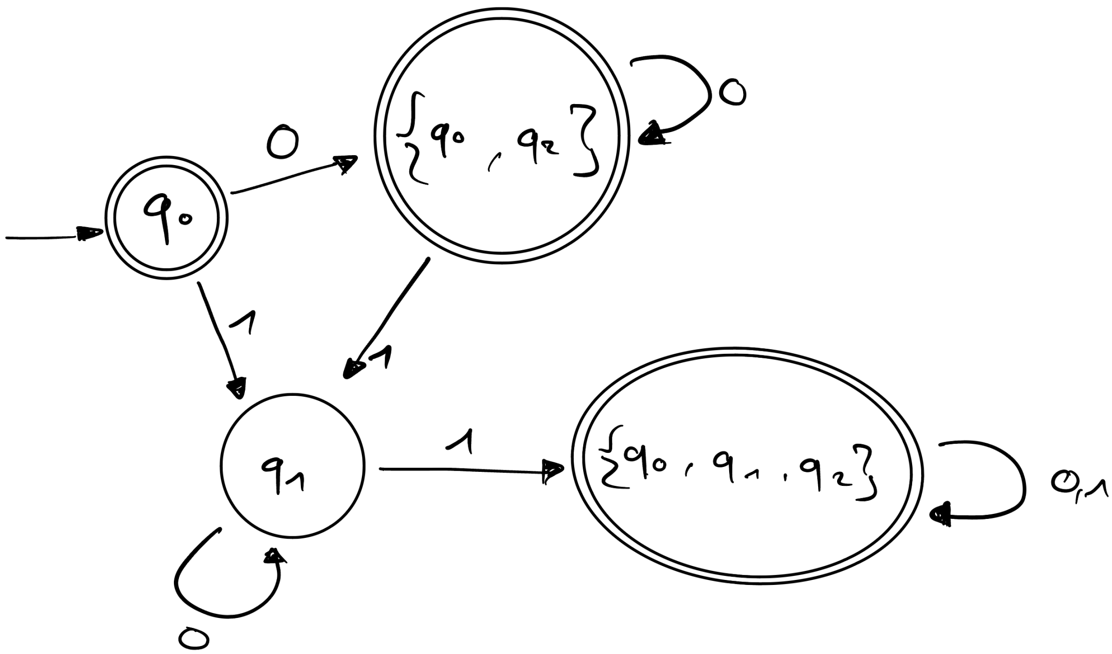


Figure 3: DFA