Exercise 2.1

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

Exercise 2.2

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

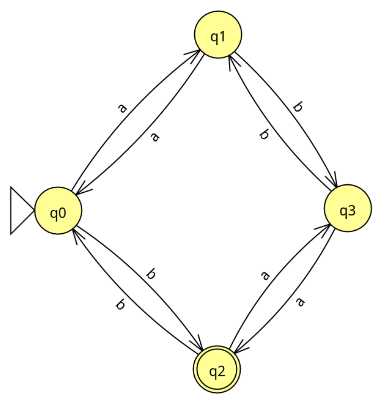

Figure 1: Graphical representation of M

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

$$q_0 \to q_1 \to q_3 \to q_1 \to q_0 \to q_2$$

As you can see, we end up at q_2 which actually is a, 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. At every NODE you have always the possibility to add an "a" or a "b", going left or right from your current position.

Exercise 2.3

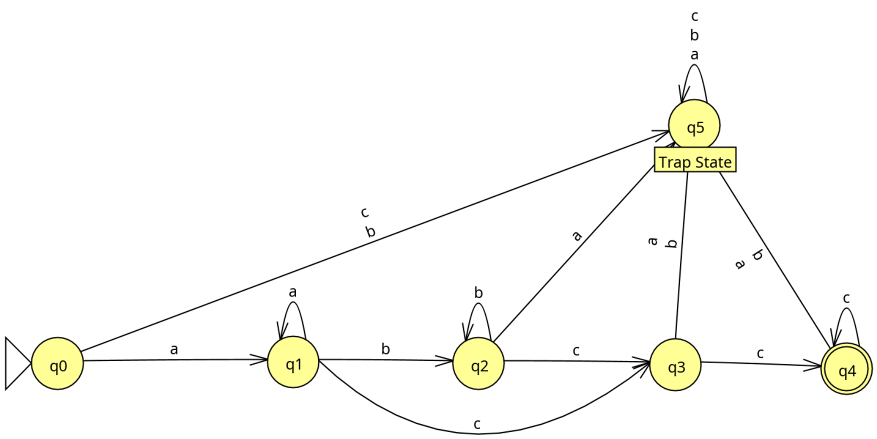

Figure 2: The DFA for the language $L = \{\, a^x\, b^y\, c^z \mid x \geq 1,\ y \geq 0,\ z \geq 2\,\}$

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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 ϵ) and then go to q_1 with 1. The following SERIES 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:

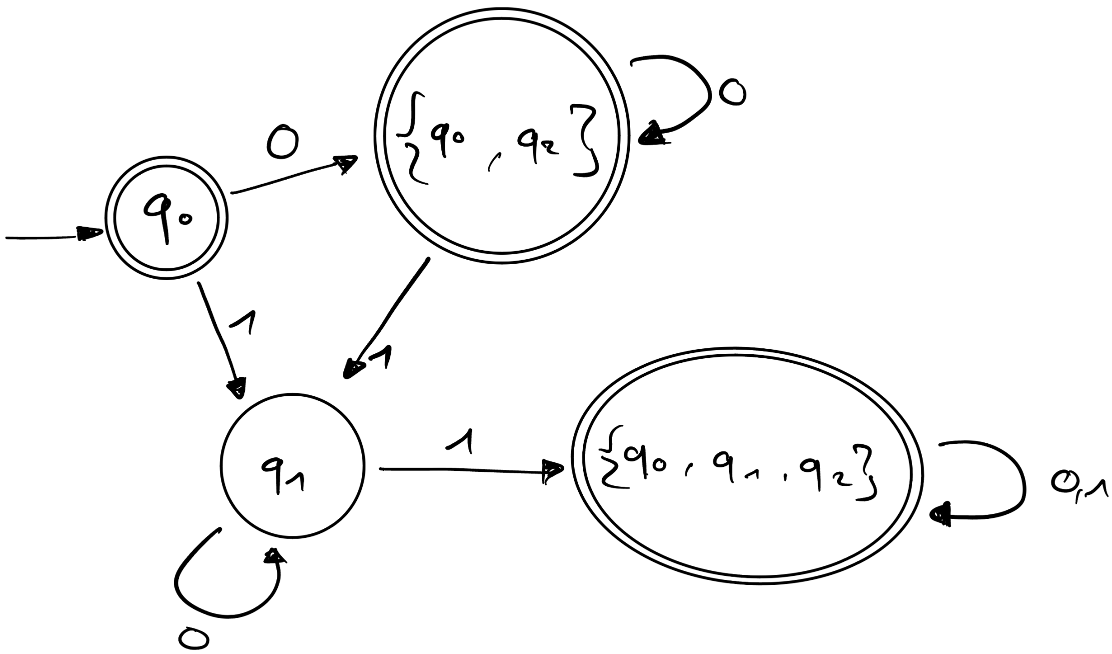

Figure 3: DFA