6	7	8	9	10

Problems Solved:

Name:

Matrikel-Nr.:

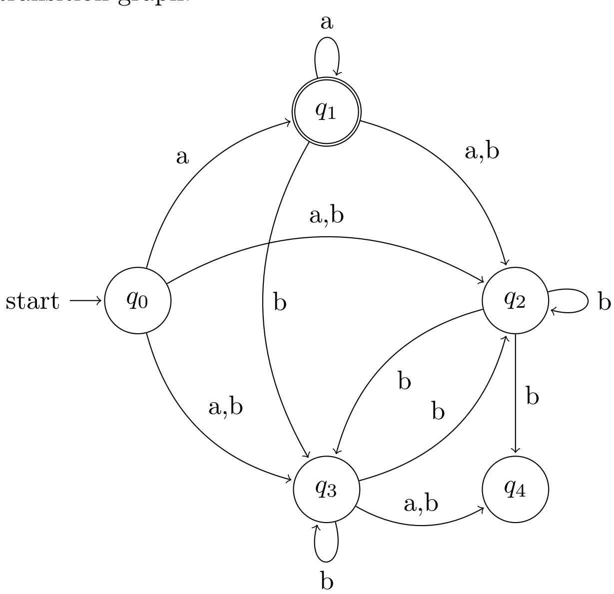
Problem 6. Solve the following tasks.

1. Write down a deterministic finite state machine D whose automata language is $L(D) = \{\texttt{finite}, \texttt{language}\}$. Note that the alphabet consists of the individual letters of the words.
2. Let $L = \{10^n1 \mid n \text{ is an even number less than } 10\}$. Construct a DFSM D such that $L = L(D)$.
   Note: Here by the term 0^n we mean the n-times concatenation of 0-s, e.g., $0^3 = 000$.
3. Does for each finite language L exist a DFSM M so that $L = L(M)$?

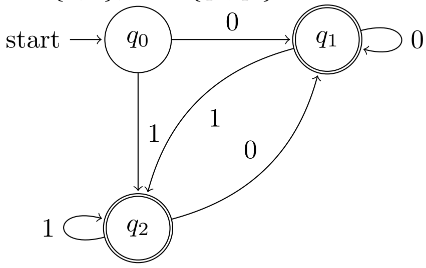
Problem 7. Construct a deterministic finite state machine M over $\Sigma = \{0, 1\}$ such that $L(M)$ consists of all words that do not contain the string 01. *Hint:* Start by constructing a nondeterministic finite state machine N that recognizes the words that *do* contain the string 01. Proceed by converting your nondeterministic machine N to a deterministic machine D that accepts the same language. Now you are left with the task of coming up with a machine M whose language is precisely the complement of the language of D. This can be done by a small modification of D.

Problem 8. Construct explicitly a deterministic finite state machine $D = (Q, \Sigma, \delta, S, F)$ with alphabet $\Sigma = \{a, b, c\}$, such that the words of $L(D)$ contain an even number of a's, an odd number of b's, and an even number of c's. For example, *aabcc*, *cacba*, *aabaabb* are from $L(D)$ and *babc*, *ccabab*, *caacbaabba* are not from $L(D)$.

Problem 9. Convert the following NFA to DFA. It suffices to give the resulting transition graph.



Problem 10. Let the DFSM $M = (Q, \Sigma, \delta, q_0, F)$ be given by $Q = \{q_0, q_1, q_2\}$, $\Sigma = \{0, 1\}$, $F = \{q_1, q_2\}$ and the following transition function $\delta : Q \times \Sigma \to Q$:



Construct a minimal DFSM D such that $L(M) = L(D)$ using Algorithm Minimize. (cf. Section 2.3 *Minimization of Finite State Machines*)