Problems Solved:

6	7	8	9	10

Name:

Matrikel-Nr.:

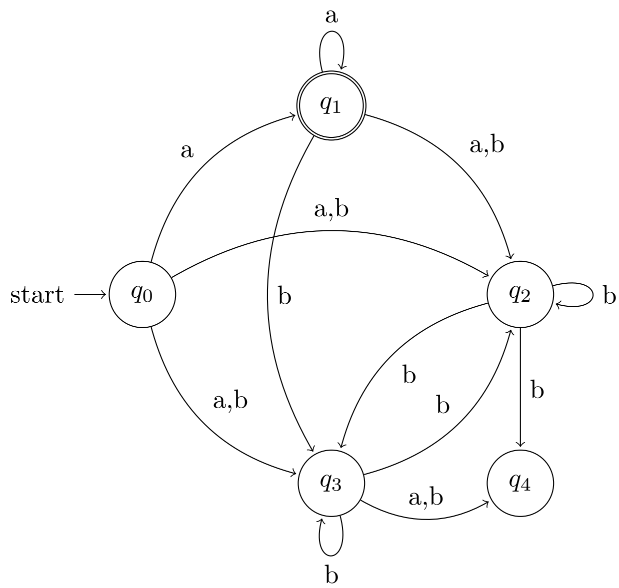
Problem 6. Solve the following tasks.

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 $L = \{10^n 1 \mid n \text{ is an even number less than } 10\}$. Construct a DFSM D such that $L = L(D)$.
3. Does for each finite language L exist a DFSM M so that $L = L(M)$?

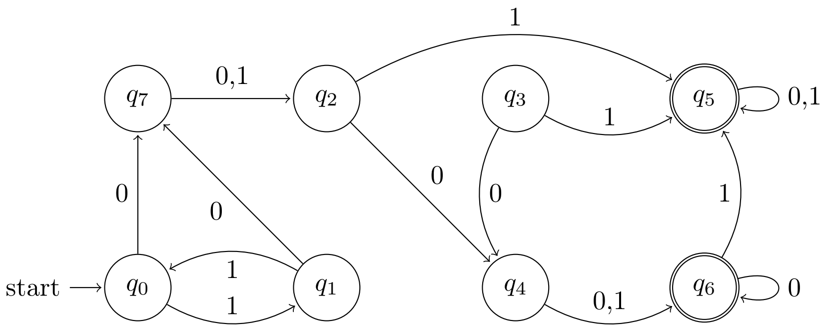
Problem 7. Construct a deterministic finite state machine M over $\Sigma = \{0, 1\}$ such that $L(M)$ consists of all words that do not contain the string 01. *Hint:* Start by constructing a nondeterministic finite state machine N that recogizes the words that *do* contain the string 01. Proceed by converting 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 $D = (Q, \Sigma, \delta, S, F)$ such that $L(D) = \emptyset$ and such that changing the set F of final states of D leads to a DFSM $D' = (Q, \Sigma, \delta, S, F')$ with $L(D') = \{\varepsilon\}$.

Problem 9. Convert the following NFA to DFA.



Problem 10. Let the DFSM $M = (Q, \Sigma, \delta, q_0, F)$ be given by $Q = \{q_0, q_1, q_2, q_3, q_4, q_5, q_6, q_7\}$, $\Sigma = \{0, 1\}$, $F = \{q_5, q_6\}$ 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*)