Problems Solved:

6	7	8	9	10

Name:

Matrikel-Nr.:

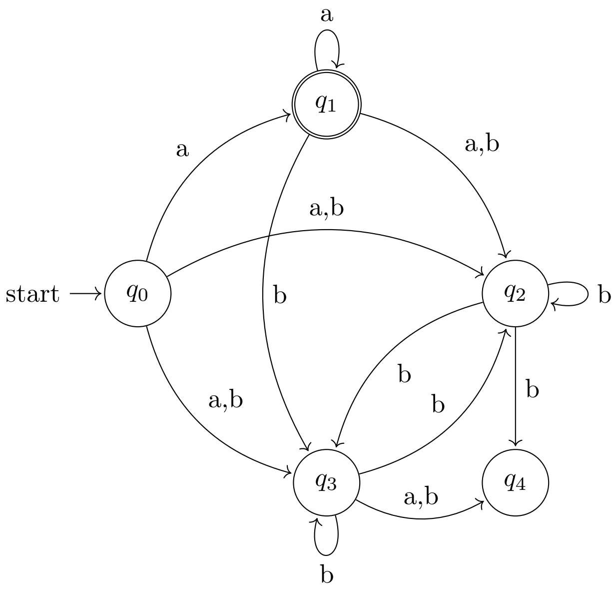
Problem 6. Let L be the set of all strings $x \in \{a,b\}^*$ with $|x| \geq 3$ whose third symbol from the right is b. For example, $babaa$ and bbb are elements of L, but bb and $baba$ are not.

1. Construct the transition graph of a NFSM N such that $L(N) = L$.
   (4 states are sufficient.)
2. Construct the transition graph of a DFSM D such that $L(D) = L$.
   (8 states are sufficient.)

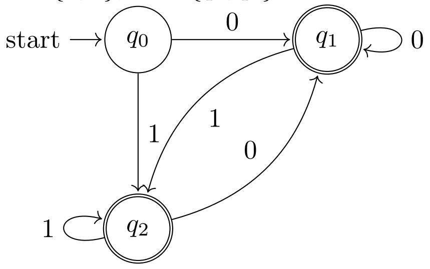
Problem 7. Construct the transition graph of a deterministic finite state machine M over $\Sigma = \{a,b,c\}$ such that $L(M)$ consists of all words that do not contain the string abc.
Hint: Start by constructing a nondeterministic finite state machine N that recognizes the words that *do* contain the string abc. 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 the transition graph of 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 odd number of c's. For example, $aabccc$, $cacbac$, $acabaabb$ are from $L(D)$ and $babc$, $ccabab$, $caacbaabba$ are not from $L(D)$.

Problem 9. Convert the following NFSM to DFSM. 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*) Provide its transition graph as well.