Problems Solved:

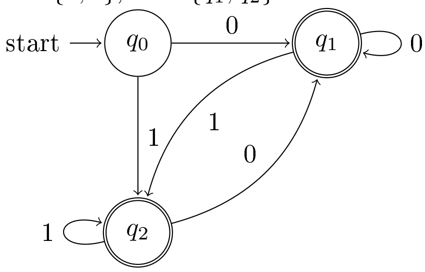
6	7	8	9	10

Name:

Matrikel-Nr.:

Problem 6. Let $N = (Q, \Sigma, \delta, S, F)$ be the NFSM given by $Q = \{q_0, q_1, q_2\}$, $\Sigma = \{0, 1\}$, $S = \{q_0\}$, $F = \{q_1, q_2\}$, and the transition function $\delta : Q \times \Sigma \to P(\Sigma)$ where $\delta(q_0, 0) = \{q_0, q_1\}$, $\delta(q_0, 1) = \{q_0, q_2\}$, and $\delta(q, \sigma) = \emptyset$ for $q \in \{q_1, q_2\}$ and all $\sigma \in \Sigma$. Construct a DFSM D such that $L(N) = L(D)$. *H*int: Use the Subset Construction, cf. Section 2.2 in the lecture notes.

Problem 7. 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*)

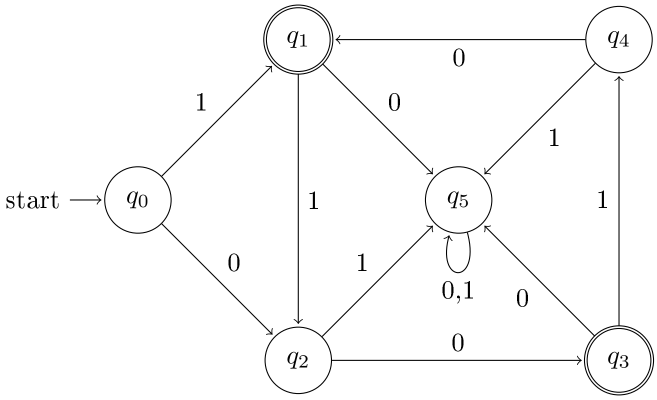
Problem 8. Construct a nondeterministic finite state machine for:

1. the language L_1 of all strings over $\{0, 1\}$ that contain 001 as a substring.
2. the language L_2 of all strings over $\{0, 1\}$ that contain the letters 0, 0, 1 in exactly that order. (Note that before, in between and after these three letters any number of other letters may occur).

Your two machines must not use more than 4 states. Moreover, they should only differ in their transition functions. Draw their transition graphs.

Problem 9. 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 by done by a small modification of D.

Problem 10. What language is accepted by the DFSM depicted below? Describe that language in your own words or, alternatively, by a regular expression.


start
q_0
q_1
q_2
q_3
q_4
q_5
0
1
0
1
1
0
1
0,1
0
0
1
0