Problems Solved:

11	12	13	14	15

Name:

Matrikel-Nr.:

Problem 11. Find a regular expression for the following (simplified) C function declaration.

$$\textsf{identifier}\ \ \textsf{identifier}(\textsf{variable-list});$$

where variable-list is empty or of type

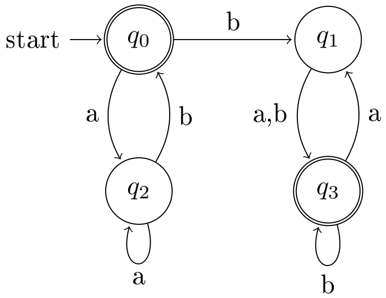
$$\textsf{identifier}\,,\textsf{identifier}\,,\ldots$$

Example: `int power(x,y);`.
For simplicity it is allowed to use the constant identifier which is defined as follows:

$$\begin{aligned}\textsf{identifier} :=& (a + \cdots + z + A + \cdots + Z)\cdot\\ & (a + \cdots + z + A + \cdots + Z + 0 + \cdots + 9)^*\end{aligned}$$

Note that there may be arbitrarily many spaces before and after any of the tokens, i.e., before and after identifiers, parentheses, commas and semicolons.

Problem 12. Let M_1 be the DFSM with states $\{q_1, q_2, q_3, q_4\}$ whose transition graph is given below. Determine a regular expression r such that $L(r) = L(M_1)$. Show the *derivation* of the the final result by the technique based on Arden's Lemma (see lecture notes).



Problem 13. Let r be the following regular expression.

$$a \cdot a \cdot (b \cdot a)^* \cdot b \cdot b^*$$

Construct a nondeterministic finite state machine N such that $L(N) = L(r)$. Show the derivation of the result by following the technique presented in the proof of the theorem *Equivalence of Regular Expressions and Automata* (see lecture notes).

Problem 14. Is the language $L := \{(ab^m)^n \mid m, n \in \mathbb{N} \setminus \{0\}\}$ regular? Draw the transition graph of an automaton whose automata language is L or prove that L is not regular.

Problem 15. Show that the language $L = \{a^m b^n \mid m, n \in \mathbb{N} \wedge m \geq 2n\}$ is not regular.