

**Formal Languages and Automata Theory, SS 2017. Homework 2 (due Week 5, respectively 6)**

1. For the grammars in Homework 1, Exercise 3, specify their type (according to Chomsky hierarchy).
2. Find the equivalent grammars from the list of grammars from Homework 1, Exercise 3.
3. Consider the languages generated by the grammars from Homework 1, exercise 3, languages  $a, b, c, d$ . Let  $L_a, L_b, L_c, L_d$  be these languages. Find grammars which generate the languages  $L_a \cup L_b, L_c \cup L_d, L_a L_b, L_c L_d, L_a^*, L_c^*$ .
4. Construct finite automata recognizing the following languages:
  - (a)  $L = \{PSDR, PNL, PUNR\}$
  - (b)  $L = \{w | w \text{ is a binary string ending in } 1\}$
  - (c)  $L = \{w | w \text{ is an identifier in C language}\}$
  - (d)  $L = \{w | w \text{ is an integer constant with sign in C language}\}$
  - (e)  $L = \{w | w \in \{0, 1\}^* \text{ and } w \text{ is a multiple of } 3\}$
  - (f)  $L = \{a^i b^j | i, j > 0\}$
  - (g)  $L = \emptyset$
5. Construct finite automata equivalent with the grammars of type 3 from Homework 1, exercise 3.
6. Construct deterministic finite automata equivalent with the nondeterministic ones from the previous exercise.
7. Find regular grammars for the automata from exercise 4 above.