Formal Languages and Automata Theory, SS 2019. Homework 2 (due Week 3)

1. For the grammars in Homework 1 (`https://merascu.github.io/links/SS2018FLAT/FLATHW1.pdf`), Exercise 2, specify their type (according to Chomsky hierarchy).

2. Devise grammars generating the following languages:

    (a) $L = \{\lambda\}$

    (b) $L = \emptyset$

    (c) $L = \{0^n | n \in \mathbb{N}\}$

    (d) $L = \{a^i b^j a^i b^j\}$

    (e) $L = \{awbbw' | w, w' \in \{0,1\}^*\}$

    (f) $L = \{w | w$ real constant in C programming language$\}$

    (g) $L = \{w \in \{0,1\}^* | w$ contains maximum 2 zeros$\}$

    (h) $L = \{wa\tilde{w} | w \in \{0,1\}^*\}$

    (i) $L = \{w | w$ is a byte representing an even number$\}$

    (j) $L = \{A, B, ..., Z\}$

3. Find the equivalent grammars from the list of grammars from Homework 1, Exercise 2. Explain your findings.

4. Consider the languages generated by the grammars from Homework 1, Exercise 2, languages a, b, c, d. Let L_a, L_b, L_c, L_d be these languages, respectively. 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^*.