Lab #8 : Pushdown Automata

Exercise 1

Give pushdown automata for the following languages:

- $L_1 = \{w \in \{a,b\}^* \mid w = a^n b^{2n},\ n \geq 0\}$
- $L_2 = \{w \in \{a,b,c\}^* \mid w = a^n b^m c^{n+m},\ n \geq 0, m \geq 0,\}$
- $L_3 = \{w \in \{a,b,c\}^* \mid w = a^n b^{n+m} c^m,\ n \geq 0, m \geq 1\}$
- $L_4 = \{w \in \{a,b,c\}^* \mid w = a^3 b^n c^n,\ n \geq 0\}$
- $L_5 = \{w \in \{a,b\}^* \mid |w|_a = |w|_b + 1\}$
- $L_6 = \{w \in \{a,b\}^* \mid |w|_a = 2|w|_b\}$
- $L_7 = \{w \in \{a,b,c\}^* \mid |w|_a + |w|_b = |w|_c\}$
- $L_8 = \{w \in \{a,b\}^* \mid |w|_a \leq |w|_b \leq 2|w|_a\}$
- $L_9 = \{w \in \{a,b\}^* \mid w = a^n b^m,\ n \geq 0, n \neq m\}$

Exercise 2

Give convincing arguments to show that the language L defined as

$$L_{10} = \{w \in \{a,b,c\}^* \mid w = a^i b^j c^k \mid i < j < k\}$$

is **not** context-free.