1. Construct a finite automaton that accepts the language generated by the regular grammar:

\[ S \rightarrow aS \]
\[ S \rightarrow bS \]
\[ S \rightarrow aaaa \]

where \( S \) is the start variable.

2. Find a regular grammar for the language

\[ L_2 = \{ w \in \{a,b\}^* \mid w \text{ does not end in 'aa'} \} \]

3. Use the pumping lemma to show that the language

\[ L_3 = \{ w \in \{a,b\}^* \mid \text{ } w_1a < w_1b \} \]

is not regular.

(make use of the game against the opponent).

4. Find a context-free grammar for the language

\[ L_4 = \{ w w^R \mid w \in \{a,b\}^* \} \]

5. Find a context-free for the language

\[ L_5 = \{ (ab)^n c^n \mid n \neq m \} \]

6. Convert the grammar \( S \rightarrow abSb | aa \) into CNF. Show and explain the main steps of your solution. What language does the grammar generate?

7. Use the CYK algorithm (in particular, the cell table) to determine whether the string 'baba' is in the language generated by the grammar \( S \rightarrow ASA | a, A \rightarrow SA | b \) (start variable \( S \)).