
CS 361 – Homework 5

Total possible points: 60

1. (15 points) Construct a **pushdown automaton** for $A = \{a^n b^m c^i \mid 0 \leq n+m \leq 2i\}$
2. (15 points) Design a **pushdown automaton** recognizing $B = \{a^n b^m c^i \mid i, n, m > 0, n \neq 2m, i \text{ is even}\}$.
3. (15 points) Design a **pushdown automaton** recognizing $C = \{a^m b^n \mid m \geq 0, 2m \geq n \geq m\}$
4. (15 points) Consider the following grammar G:

$$\begin{aligned} S &\rightarrow 01Sba \mid A \\ A &\rightarrow abA10 \mid \epsilon \mid B \\ B &\rightarrow ccB \mid \epsilon \end{aligned}$$

- a. What are the variables of G?
- b. What are the terminals of G?
- c. What is the start variable of G?
- d. Give 2 strings that are in $L(G)$
- e. Give 2 strings over the alphabet of G that are not in $L(G)$
- f. True or False: $R \Rightarrow^* 01abcc10ba$
- g. True or False: $R \Rightarrow^* 01baccab10$
- h. True or False: $R \Rightarrow^* 01ccba$
- i. True or False: $R \Rightarrow^* \epsilon$
- j. Describe $L(G)$ using set notation, i.e., which types of strings are generated using G