Assignment III (20 pts)

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Assigned : May the 12th, 19h00
Due : May the 19th, 19h00

Q1. (4 pts) Transform the grammar $G = (\{S, A, B\}, \{a, b\}, P, S)$ with below production rules P

$$S \rightarrow ASB \mid B \mid a \mid \varepsilon$$
$$A \rightarrow bASA \mid a \mid \varepsilon$$
$$B \rightarrow SbbS \mid BASB \mid b$$

into an equivalent grammar G' in Chomsky Normal Form. Clearly show intermediate steps.

Q2. (8 pts) Design a non-deterministic push down automaton (NPDA) $N = (Q, \{a, b, c\}, \{\perp, x\}, \delta, s, \perp, F)$ that recognizes the language

$$A := \{a^i b^j c^k \mid k > i > 0 \text{ or } j \geqslant i > 0\}.$$

Justify your design in a few lines.

Q3. (8 pts) Design a non-deterministic push down automaton (NPDA) $N = (Q, \{x, y, z, w\}, \{\perp, a\}, \delta, s, \perp, F)$ that recognizes the language

$$A := \{x^i y^j z^k w^m \mid i = k \geqslant 0, j \text{ is odd and } m \geqslant 0\}.$$

Justify your design in a few lines.

Important Notice:

- Collaboration is strictly and positively prohibited; lowers your score to 0 if detected.
- Any submission after 19h00 on May the 19th will NOT be accepted. Please beware and respect the deadline!
- All handwritten answers should somehow be scanned into a single pdf file, and only then submitted. Make sure that your handwriting is decent and readable.