
Homework 5

Exercise 0.1 Design a PDA to accept each of the following languages.

1. $\{a^i b^j c^k : i = j \text{ or } j = k\}$.
2. The set of all strings with twice as many 0's as 1's.

Exercise 0.2 Show that if P is a PDA, then there is a PDA P_2 with only two stack symbols, such that $L(P_2) = L(P)$. Hint: Binary-code the stack alphabet of P .

Exercise 0.3 Use the CFL pumping lemma to show each of these languages not to be context-free.

1. $\{a^i b^j c^k : i < j < k\}$.
2. $\{a^n b^n c^i : i \leq n\}$.
3. $\{0^p : p \text{ is prime}\}$.

Exercise 0.4 Give an algorithm to decide the following: Given a CFG G and one of its variables A , is there any sentential form in which A is the first symbol. Note: Remember that it is possible for A to appear first in the middle of some sentential form but then for all the symbols to its left to derive ε .

* Exercises above are from *Introduction to Automata Theory, Languages, and Computation, 3rd Edition*: Exercises 6.2.2, 6.2.7, 7.2.1(a)(b)(c), 7.4.1(c)