Homework 4

January 29, 2015

Exercise 1 (Ex 5.4.3, page 216)**.** *Find an unambiguous grammar for the following language:*

$$S \to aS \mid aSbS \mid \epsilon$$

Exercise 2 (Ex 6.2.1, page 241)**.** *Design a PDA to accept each of the following languages. You may accept either by final state or by empty stack, whichever is more convenient.*

a) $\{0^n 1^n : n \geq 1\}$.

b) The set of all strings of 0*'s and* 1*'s such that no prefix has more* 1*'s than* 0*'s.*

c) The set of all strings of 0*'s and* 1*'s with an equal number of* 0*'s and* 1*'s.*

Exercise 3 (Ex 6.2.2, page 241-242)**.** *Design a PDA to accept each of the following languages.*

a) $\{a^i b^j c^k : i = j \text{ or } j = k\}$.

b) The set of all strings with twice as many 0*'s as* 1*'s.*

Exercise 4 (Ex 6.2.3, page 242)**.** *Design a PDA to accept each of the following languages.*

a) $\{a^i b^j c^k : i \neq j \text{ or } j \neq k\}$.

b) The set of all strings of a*'s and* b*'s that are* not *of the form* ww*, that is, not equal to any string repeated.*

Exercise 5 (Ex 6.2.7, page 241)**.** *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*.*

Exercises are from the book “Automata Theory, Language, and Computation”, 3rd edition, by John E. Hopcroft, Rajeev Motwani, and Jeffrey D. Ullman, published by Addison-Wesley.