Homework 6

Cpt S 317, Spring 2017

Due Date: April 5, 2017

Total points: 46

This homework involves design of PDAs. For all questions, provide the state diagram representation of the PDAs, clearly denoting the start state, the starting stack symbol and final states (if any or if applicable). And, please draw the PDAs consistent with the conventions described in the lectures (slides #3,#4 and #7 in the PDA lecture notes describe these conventions, and slide #8 shows an example). Ambiguous or different conventions could be wrongly interpreted and may lead to reduction of points to varying degrees depending on the severity of the errors.

Some problems in this homework may refer to problems from the book. Please make sure you have the correct US edition of the book to look up these questions. Solutions provided for solving the wrong problems will get zero points.

---

1. (8 points)

   (a) Draw the state diagram representation for the PDA defined in the question of Exercise 6.1.1 in the book. (Note: No need to solve any of the parts of that question. I just want the pictorial depiction for that PDA.)

   (b) Convert this PDA into an equivalent PDA that accepts by empty stack.

2. (10 points) Exercise 6.2.1 parts b and c. You may design a PDA that either accepts by final state or by empty stack, whichever is more convenient. In your solution, however, explicitly state which of these two types you are designing.

3. (5 points) Let L = $\{ w \mid w$ is of the form $a^{2n}b^n$, where $n \geq 0\}$. Design a PDA for L. You may design a PDA that either accepts by final state or by empty stack, whichever is more convenient. In your solution, however, explicitly state which of these two types you are designing.

4. (8 points) Consider language L which is the set of all strings where the number of a's is twice the number of b's. (Note: the order in which the symbols appear is irrelevant as long as the above count property is satisfied.) Design a PDA for L. Again, you can design any type of PDA as long as you state explicitly which type you are designing.

5. (5 points) Exercise 6.3.2.

6. (10 points) Exercise 6.4.2 parts a and b. For both these questions, assume $m \geq 1$ and $n \geq 1$.