CSE 322 Autumn 2009
Assignment #6

Due: Monday, November 23, 2009 in class

Reading assignment: Read Section 2.2 of Sipser's book and the handouts on conversions to Chomsky Normal Form and on Bottom-up Parsing.

Problems:

1. Sipser's text, 2nd edition Problem 2.26 (1st edition Problem 2.19).

2. Convert the following grammar to Chomsky normal form using the procedure on the handout.

$$
\begin{aligned}
S &\rightarrow A \mid ABa \mid AbA \\
A &\rightarrow Aa \mid \epsilon \\
B &\rightarrow Bb \mid BC \mid AS \\
C &\rightarrow CA \mid bB
\end{aligned}
$$

   Show your steps.

3. For any language A, let $PREFIX(A) = \{x \mid xy \in A \text{ for some string y}\}$. Show that the class of context-free languages is closed under the $PREFIX$ operation.

4. Sipser's text, 2nd edition Exercise 2.5 (b), (c), (d), (e) (1st edition Exercise 2.5 (b), (c), (d), (f)). Do this by direct construction. Do not use grammars or either of the two parsing methods to create your PDAs. Your informal descriptions should document your diagrams.

5. Carry out the general top-down construction to convert a CFG to a PDA (the one done both in class and in the text) for the following grammar:

$$S \rightarrow (S0) \mid [0S] \mid SS \mid \epsilon$$

   Now, do the same for the bottom-up construction given in class.
   Finally, for each of the PDAs show a sequence of configurations that would cause the PDA to accept the input $(0)[0[0((0)[0]0)]]$.

6. (Extra credit) Sipser's text, 2nd edition Problem 2.22 (1st edition Problem 2.26).