Homework Assignment #7
Due: November 17, 4:00 p.m.

1. Prove that the class of context-free grammars is closed under reversal. (In other words, show that the language L^R is context-free for every context-free language L.)

2. A context-free grammar is *ambiguous* if there exists some string that has two different parse trees.

Consider the CFG G defined by the following productions.

$$S \to a \mid bS \mid bScS$$

(Remark: If you think of a as a simple statement, b as an "if" condition, and c as an "else", then this is one possible grammar for if-then-else statements.)

(a) Show that G is ambiguous.

(b) Give the production rules for an unambiguous grammar G' such that $L(G') = L(G)$. You should explain why your answer is correct, but you do not have to give a formal proof.

(c) How does Java avoid this ambiguity problem when dealing with if-then-else statements?