CS 383
HW 6

Due in class on Friday, November 15.

This one should be typed.

1. Convert the following grammar into Chomsky Normal Form:
   S => ASB | ε
   A => aAS | a
   B => SbS | A | bb

2. Chomsky Normal Form forces parse trees to be binary trees. Some people like trinary trees. Say that a grammar is in "Bobsky Normal Form" (BNF) if all rules have the form A => BCD or A => a, where A,B,C, and D are grammar (nonp-terminal) symbols and a is a terminal symvol (i.e., a is in Σ). Can all context free grammars be converted to Bobsky Normal Form? Either find a grammar that can't be converted or prove that all can.

3. Show that $\{0^i1^j2^k \mid i < j < k\}$ is not context-free

4. For each of the following languages either prove that the language is context-free or prove that it isn't:
   a. $\{0^n1^m \mid n, m > 0\}$
   b. $\{0^n1^m \mid n > 0, m=n\}$
   c. $\{0^n1^m \mid n > 0, 0 < m < 2n\}$
   d. $\{0^n1^m2^n \mid n, m > 0\}$
   e. $\{0^n1^m2^n\ n, m > 0, 0 < m < n\}$

5. Give an algorithm for determining if the language derived from a given context-free grammar is infinite. Your algorithm must terminate for every context free grammar.

6. Give an algorithm for determining if the language derived from a context-free grammar G is empty (i.e., the grammar derives no strings).