Assignment 4

Due: October 27th

Problem 1 Give CFGs that generate the following languages:

a) A = {w | w starts and ends with the same symbol}

b) B = {w | $w \in \{0,1\}^*$ is not a palindrome}

Problem 2 For the language:

$$B = \{w \in \{a,b\}^* \mid \text{The first, middle, and last character are the same}\}$$

a) Using the pumping lemma, show that B is *not* regular.

b) Give a CFG that generates the language B.

Problem 3 Convert the context-free grammar for {w | $w \in \{0,1\}^*$ is not a palindrome} into Chomsky normal form using the procedure from class.

Problem 4 Prove or disprove: If G is a CFG in Chomsky normal form, then for any string $w \in L(G)$ of length $n \geq 1$ then exactly $2n-1$ steps are required for any derivation of w.