CS 4810 Homework Assignment 6 due Monday class Oct 2

1. Construct a nondeterministic pda to accept all strings of a's and b's that are not of the form $\{ww^R | w \in \{a+b\}^*\}$. This problem counts as two homework problems.

2. If $L = L_1 \cup L_2$ and neither L_1 nor L_2 is a context-free language does this imply that L is not a context-free language?

3. Describe how to convert a pushdown automaton that accepts by final state to a pushdown automaton that accepts by empty store.

4. A variable in a context-free grammar is useless if it cannot be used in any valid derivation of a string in a context-free language. Describe how to remove all useless variables from a context-free grammar.