CS 4810 Homework Assignment 7 due Friday class Oct 13.

1. Prove that the class of context-free languages is closed under homomorphisms.

2. Use the pumping lemma to prove that $\{www | w \in (a+b)^*\}$ is not a context-free language. Your grade will depend on the quality of writing.

3. Use the pumping lemma to prove that $\{a^n b^m c^n d^m | n \geq 1, \ m \geq 1\}$ is not a context-free language. Your grade will depend on the quality of writing.

4. Explain in a few sentences how to convert a many state pushdown automaton to a single state pushdown automaton.

5. Construct a context-free grammar that generates the complement of the language $\{ww | w \in (a+b)^*\}$.