CS 4810 Homework Assignment 5 due in class Monday Oct 1

1. Use the pumping lemma to prove that $L = \{ww | w \in (a+b)^*\}$ is not a regular set. Carefully explain your steps. Credit will be given on the quality of your write up.

2. Use the pumping lemma to prove that $L = \{a^i b^j c^k | j < i \text{ or } k < j\}$ is not a regular set. Carefully explain your steps. Credit will be given on the quality of your write up.

3. How would you determine if two regular expressions denoted the same set?

4. Define the substitution s of regulars sets $\{R_a | a \in \Sigma\}$ into a set L to be the set obtained by replacing each symbol a in each string in L by a string from R_a in every possible way. Example: $L = a^n b^n \quad s(a) = ab \quad s(b) = bba^* \quad s(L) = (ab)^n (bba^*)^n$ Prove that if L is a regular set, then $s(L)$ is regular.

5. If s is a substitution of regular sets and L is a regular set, is $s^{-1}(L)$ a regular set?