

CS 4810 Homework Assignment 8 due Friday class Nov 1 (two weeks to do.)

Please place your net ID in upper right corner of your homework

1. Prove that every context-free language over a one symbol alphabet is a regular set.
2. Prove that $\{a^i b^j c^k \mid i \neq j, i < k\}$ is not a context-free language.
3. Prove that the class of context-free languages is closed under complement with a regular set R using a grammar construction.
4. The variable A in a context-free grammar is useless if it cannot be used in the derivation of any string. Give an algorithm for eliminating useless variables in a context-free grammar.
5. How many parse trees are there for the string $aabbab$ in the context-free grammar with the following productions.

$$S \rightarrow AB \mid BC$$

$$A \rightarrow BA \mid a$$

$$B \rightarrow CC \mid b$$

$$C \rightarrow AB \mid a$$