Assignment 5

Due: November 8th

Problem 1 (Sipser 2.30 a,d) Use the pumping lemma to show that the following languages are not context-free.

a) A = $\{0^n1^n0^n1^n \mid n \geq 0\}$

b) B = $\{t_1\#t_2\#...\#t_k \mid k \geq 2$, each $t_i \in \{a, b\}^*$, and $t_i = t_j$ for some $i \neq j\}$

Problem 2 The languages $\{0^s1^s2^t \mid s, t \geq 0\}$ and $\{0^s1^t2^t \mid s, t \geq 0\}$ are context-free. Use those languages to answer the following:

a) Write down CFGs for each of the languages.

b) Use the fact that both languages are context-free to show that the class of context-free languages is *not* closed under intersection. (Use the context-free pumping lemma to show that the resulting language is not context-free.)

c) Use the result from part *b* and DeMorgan's Laws to show that the class of context-free languages are *not* closed under complement.