CS 273: Intro to Theory of Computation, Spring 2008
Problem Set 10
Due Tuesday, April 1st, 10am

This homework contains one problem and one bonus problem. Please submit each on a **separate sheet of paper**. Turn in your homework at Elaine Wilson's office (3229 Siebel).

1. Turing machines.

   Give the state diagram for a Turing Machine for the following language.

   $$L = \{a^n b^{n+1} c^{n+2} | n \geq 0\}$$

   To simplify your design, you can assume the beginning of the string is marked with $*$. (Inputs that don't start with a $*$ should be rejected.) For example, the input may look like $*abc$.

   You do not need to draw transitions that lead to the (implicit) reject state. Hence, any transition that is not present in your diagram will be assumed to lead to the reject state. Indicate which symbol (e.g. $\sqcup$ or B) you are using for the special blank symbol that fills the end of the tape.

2. Context-free Pumping Lemma. (bonus)

   Use pumping lemma for CFLs to show that L is not a CFL:

   $$L = \left\{ \mathtt{a}^i \mathtt{b}^j \mathtt{c}^k \;\middle|\; i < j < k \right\}.$$