CS 581: Theory of Computation
Spring 2010
Mid-term exam
James Hook

This is a closed-notes, closed-book exam.

1. Defining Regular languages

   (a) Show that the set of binary numbers congruent to 3 mod 5 is regular by constructing a DFA.

   (b) State the definition of acceptance for a DFA.

   (c) Illustrate the definition of acceptance by showing that the machine accepts the string encoding the number 13.

2. Defining Context Free Languages

   (a) Show the set of strings over $\{a, b\}$ that are not palindromes is context free. (You may use either a grammar or an automaton to do this.)

   (b) Justify your construction.

   (c) Illustrate on the string "abaa" (which is not a palindrome and should be accepted).

3. Not Regular

   Show that the language of non-palindromes is not regular. (Recommend showing infinite index.)

4. Pumping Lemma

   State and prove the pumping lemma for regular languages.