Final Exam

CS 381   Wednesday
Fall 2004   Dec 15, 2004
Upson B17 9-11:30

This is a closed book exam. All questions are straight forward. Please show all work and write legibly. Credit will be based on both correctness and clarity of answers.

1. Let R be a regular expression. Let S=1R1 be the regular expression denoting all strings of R with a 1 appended to both the beginning and the end of each string in R. Delete every block of 0's of even length in S. Prove or disprove that the resulting set is regular.

2. Is the class of context-free languages closed under complement? Give a proof for your answer.

3. Outline the proof that a one state nondeterministic pda can simulate a many state nondeterministic pda.

4. State and prove Rice's theorem for recursively enumerable sets.

5. (a) What does it mean to say that a problem is NP-complete?
(b) State what the clique problem is?
(c) Prove that the clique problem is NP-complete. You may assume that the 3-CNF satisfiability problem is NP-complete in your proof.

Problems will be graded on clarity and conciseness of answers as well as correctness. Good luck and have a nice holiday.