Guide to Exam 1

Time and Place

Exam 1 will be held during the regular class time on February 7th, 2013. We will take 15 minutes for questions and review, before starting the exam at 6:15 pm, ending the exam at 7:55 pm. We will then continue with a one hour lecture.

The exam is open book and notes, but no electronics. You may use your notes, homeworks, a printed copy of the textbook, and any other paper-based references.

General Things to Know

- Strings

- Languages: union, intersection, complement, concatenation, star

- Finite automate: DFAs NFAs (both formal descriptions and state transition diagrams)

- Regular languages

- Closure properties of regular languages: closed under union, intersection, complement, concatenation, star, reverse

- Regular expressions

- Equivalence of DFAs, NFAs, regular expressions, regular languages

- Pumping lemma

Specific Things You Should Know How to Do

- Given a formal description of a simple DFA or NFA, construct the corresponding state transition diagram and vice-versa

- Given a simple DFA or NFA, be able to identify what language it recognizes.

- Given a simple regular expression, be able to identify what language it describes

- Given a description of simple regular language, be able to construct

- a DFA or NFA that recognizes it
- a regular expression that describes it

- Given DFAs, be able to construct a DFA for their union, intersection, and complement

- Given NFAs, be able to construct an NFA for theri union, concatenation, and star

- Understand the main steps in the proof of Kleene's theorem (the equivalence of regular expressions, NFAs, and DFAs) and be able to carry out these constructions in simple examples:

  - Given an NFA, construct an equivalent DFA
  - Given a DFA, convert it to an equivalent regular expression
  - Given a regular expression, construct an equivalent NFA

- Be able to apply the Pumping Lemma for regular languages to prove a language is non-regular

- Be able to apply the closure properties of regular languages to prove a language is or is not regular

In addition you should understand the basic ide behind the proof of the Pumping Lemma for regular languages: when a DFA processes a sufficiently long string, the computation path it follows must have a loop.