Midterm 1

Suggestions on how to study: Read again the course notes carefully and similar material in the text and supplements. Review your own homework and make sure you understand the mistakes you made. Scan my course notes again to see what questions (requiring say 15 minutes each) you might ask on a midterm if you were asked to create one.

Some of the things to study and understand

- Alphabets, Strings, Languages. Recursively enumerable (r.e) sets, recursive sets, algorithms and procedures. Definitions using "black boxes." Recognizing a language, generating a language.
  Sizes of sets, including various levels of infinity, and relationships with sizes of alphabets, strings, and languages. Effective enumeration.

- Proof techniques including induction, contradiction, diagonalization.

- The Chomsky Hierarchy. Grammars: definitions and types.

- Finite state machines (Mealy, Moore) and related discussions. Behavior functions and use in disproving a language being finite state realizable. Nerode equivalence and notion of "state." Myhill-Nerode theorem. State reduction algorithm. Notion of equivalence of states and machines. Notion of a more or less powerful machine.

- Deterministic finite-state acceptors (dfa) and non-deterministic finite-state acceptors (nfa). λ moves and ε-closure. Eliminating λ moves. nfa to dfa algorithm. (Note that the words "acceptor" and "automata" (or automaton) are used interchangeably.)

- Regular expressions.

- Equivalence of NFAs, DFAs, Regular Expressions and Regular Grammars. Understand the proofs. Algorithms for: nfa → dfa, nfa → regular grammar, regular grammar → nfa.

- Generalized transition graphs. Finding a regular expression using this approach.

- Finding a grammar from a language definition (based on describing language in English / set notation). Finding an fsa or nfa from a language definition. Finding a regular expression from a language definition.