6.045J/18.400J: Automata, Computability and Complexity	Prof. Ron Rivest
Handout 2: Quiz 1 Information	
5 Wednesday 2003	*Matthew Lepinski*

1 General Information on Quiz 1

Quiz 1 will take place during class on Wednesday, February 26. The Quiz will cover chapters 0 and 1 of Sipser's Text, "An Introduction to the Theory of Computation. You are encouraged to bring a two-sided sheet of handwritten notes with you to class on Wednesday to use during the quiz. You should bring your copy of Sipser's Text with you to class on Wednesday to use during the quiz. However, be advised that bringing a copy of the text is not a substitute for studying the text before hand. You will only have an hour and a half to complete the quiz and so you will not have enough time during the quiz to carefully read portions of the text which you are unfamiliar with.

2 Material You Should Know for the Quiz

The following is a list of important topics and ideas we have covered so far in this class.

- **Mathematical Preliminaries**. You should be familiar with the mathematical concepts from Chapter 0. Specifically, you should have an understanding of sets, graphs, functions, relations and mathematical logic.
- **Proof Techniques**. You should be comfortable with basic proof techniques such as proof by induction and proof by contradiction. Additionally, you should be able to proof simple theorems related to the material in Chapter 1.
- **Deterministic Finite Automata**. You should understand the formal definition of a DFA, as well as the representation of a DFA as a state diagram. Additionally, you should understand how a DFA computes and what it means for a DFA to accept an input string.
- **Nondeterministic Finite Automata**. You should understand the formal definition of a NFA, as well as the representation of a NFA as a state diagram. Additionally, you should understand how a DFA computes and what it means for a NFA to accept an input string.
- **Regular Expressions**. You should understand the inductive (recursive) definition of a regular expression. Additionally, you should be able to tell when a regular expression matches a given input string.
- **Regular Languages**. You should understand what it means for a language to be regular. You should be able to produce examples of regular languages. Given a regular language you should be able to create a DFA, NFA or Regular Expression that recognizes the given language.
- **Regular Operations**. You should know that the class regular languages is closed under the operations of union, concatenation, star and complementation. You should understand how to prove theorems of the form, if L_1 and L_2 are regular, then L_1 union L_2 is regular.
- **Equivalence of DFAs and NFAs**. You should understand that DFAs and NFAs recognize the same class of languages. You should be able to convert an NFA into a DFA that recognizes the same language.
- **Equivalence of NFAs and Regular Expressions**. You should understand that NFAs and Regular Expressions recognize the same class of languages. You should be comfortable with Generalized Nondeterministic Finite Automata. You should be able to convert an NFA into a regular expression and vice versa.
- **Non-Regular Languages**. You should understand what it means for a language not to be regular. You should know several examples of languages that aren't regular. You should be familiar with the pumping lemma. You should be able to prove that simple languages aren't regular.