Computer Science 456/656 Fall 2007
Automata and Formal Languages

Syllabus

Section and page numbers refer to Sipser, second edition.

1. Deep questions.
   (a) Can you "know" π?
   (b) Can anything be bigger than infinity?
   (c) Do simple questions always have simple answers?
   (d) Can truth always be discovered by reason?
2. Alphabets, strings, and languages (page 13)
3. Regular languages and finite automata.
   (a) Finite automata (1.1, 1.2).
   (b) Regular languages and regular expressions (1.3).
   (c) The pumping lemma (1.4).
4. Context-free languages
   (a) Context-free grammars (2.1).
   (b) Context-free grammars for algebraic languages.
   (c) LALR parsing.
   (d) Push-down automata (2.2).
   (e) The other pumping lemma (2.3).
5. Computability and Decidability.
   (a) Turing machines (3.1, 3.2, 3.3).
   (b) The halting problem and other undecidable problems (4.1, 4.2).
6. Complexity theory.
   (a) The polynomial class $\mathcal{P}$-TIME (7.2).
   (b) The class $\mathcal{NP}$-TIME (7.3).
   (c) $\mathcal{NP}$-completeness (7.4).
   (d) Parallel computation and Nick Pippenger's class (10.5).