

PRE-MIDTERM PREPARATION  
April 29, 2006

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The midterm is Friday, May 5 in class. There will be a review session, Thursday May 4 at 4:30, place TBA.

You can bring in **one**  $8\frac{1}{2}$ "  $\times$  11" review sheet. You can use only **one side**. Needless to say, bringing in a review sheet that violates these rules is not allowed (and would be considered as cheating). A bit of advice: do not spend a lot of time trying to cram in stuff on the sheet— the exam would primarily test how well you have understood the material. The exam will be closed book and closed notes (except for the review sheet).

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The midterm will cover up to the end of the material on Finite Automaton. Here is a list of the main topics you are expected to be familiar with for the exam.

1. Strings and languages and operations on them.
2. Regular expressions and regular languages.
3. Deterministic finite automata: Formal definition,  $L(M)$ , as well as state diagrams.
4. Nondeterministic finite automata: Formal definition,  $L(M)$  for NFAs as well as state diagrams.
5. Converting NFAs to DFAs: The subset construction.
6. Construction of an NFA to accept language described by any regular expression.
7. Construction of a regular expression representing the language accepted by any NFA.
8. Closure properties of regular languages, e.g. closure under complement, intersection, reversal.
9. Proofs that languages are not regular using the pumping lemma and using equivalence relation  $\equiv_A$ .
10. The fact that (not the proof)  $A$  is regular if and only if  $\equiv_A$  has a finite number of equivalence classes.
11. Minimizing DFAs.