

Exercises for “Computer Science II” — SS 2003

No. 9

Due: July 11, 2003

Regular Expressions and Finite Automata

1. (1 point) What are the three basic operations that can be used to build complex regular expressions from simpler regular expressions?
2. (1 point) If nondeterministic finite automata (NFA) and deterministic finite automata (DFA) accept the same set of languages, why do we distinguish between the two?
3. (2 points) Summarize the process by which a lexical description of a programming language is transformed into a scanner (lexical analyzer).
4. Write regular expressions for each of the following.
 - a) (2 points) Strings over the alphabet a, b with an even number of a 's.
 - b) (2 points) Binary numbers (strings over the alphabet $0, 1$) that are multiples of four.
5. (2 points) Show (as state transition diagrams) the deterministic finite automata for your answers to 4a and 4b. Remember that you can always convert a regular expression to an NFA and then from an NFA to a DFA.