

Recitation 4: Algorithms for Automata

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Vinod Vaikuntanathan

Problem 1: Quiz Questions?

Problem 2: Procedures for testing properties of FAs There are (at least) two conceptually different ways to test programs. One way is to use the DFA as a “black-box”. i.e, all that is given to you is a black-box containing the DFA, and you are only allowed to query the DFA on a string x and see if it accepts or not. Strictly no peeking in !! (Assume that you are also given the size of the DFA). The other way is to take the DFA and examine its internals - such as the paths from the start state to the final states etc. This is, of-course, called “white-box” testing.

1. E_{DFA} - We saw in class how to test if a DFA M recognizes exactly the empty language, and that was a white-box test. Now, let's think about how to test if $L(M) = \emptyset$ by using M as a black-box. Intuitively, one has to run M on all strings up to a certain size. What size works?
2. F_{DFA} - We saw in class (but it is not in Sipser) how to test if a DFA M recognizes a finite language by seeing if it rejects all strings of length $|M|$ to $2|M|$. Now, let's think about how to test if M recognizes a finite language via a graph-based search. What are we looking for?
3. Design a test that determines if a given DFA M accepts some string of even length.
4. Design a test that, given a DFA M , determines if M has the following property: M accepts $w^{\mathcal{R}}$ whenever it accepts w .