

COSC341 TUTORIAL 1

The theme of this tutorial is to experiment with small deterministic finite state automata (DFAs) in order to try and get some feeling about what they can do, and similarities and differences between them.

The alphabet $\Sigma = \{a, b\}$ is to be used throughout.

In answering the “What languages do they accept?” questions, a simple description in English is fine, e.g., “all non-empty strings” or “all strings starting with an a ”.

1. How many different DFAs are there having only one state? What languages do they accept?
2. A state in a DFA is *unreachable* if there is no input sequence that leads to that state. Note that the start state is always reachable since the empty sequence leads to it. If we remove the unreachable states from a DFA how does that affect the language it accepts?
3. How many different DFAs are there having only two states? What languages do they accept? Are they all different?
4. A state in a DFA that is not accepting and all of whose transitions are loops back to itself is sometimes called a “garbage state”. Why?
5. How many three state DFAs are there all of whose states are reachable and exactly one of which is a garbage state? What languages do they accept?