

**CURTIN UNIVERSITY OF TECHNOLOGY** (CRICOS number: 00301J)  
**Division of Engineering, Science and Computing**  
**Department of Computing**

Theoretical Foundations of Computer Science 300 (Index No. 12334)  
Theoretical Foundations of Computer Science 552 (Index No. 302976)

## **Work Sheet 1**

### **AIM:**

- To explore DFAs.
- To classify problems as being appropriate for DFAs.

You may undertake the work in this worksheet as a group activity if you wish, however each student is individually responsible for their own learning. If you work in a group, make sure you understand how any answers were arrived at.

The worksheet will not be submitted or marked, and no answers will be given directly. The questions in this sheet will be discussed in the tutorial in week 1 of semester, along with other questions of a similar nature.

### **ACTIVITY 1: Discussion Question**

On p154, Savage claims that “all realistic computational problems are finite in nature and can thus be solved by [Finite State Machines].”

- a) Is this claim true?
- b) If the claim was true, would that mean that a FSM such as a DFA can do everything that we want a computer to be able to do? Could we design a desktop FSM for our personal computing needs?

### **ACTIVITY 2: Classifying DFA Problems**

We are to test whether a binary data file contains a certain binary string. For each of the strings described below, determine whether a DFA can be used to do the testing. If so, design an appropriate DFA. If not, explain why you believe it is not possible.

- a) The string “001”.
- b) One to three ‘0’s, followed by a ‘1’.
- c) One to three ‘0’s, followed by the same number of ‘1’s.
- d) Three or more ‘0’s, followed by the same number of ‘1’s.

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**End Of Work Sheet 1**