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 2

AIM:

- To explore NFAs.
- To practice the conversion between NFAs and 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 2 of semester, along with other questions of a similar nature.

ACTIVITY 1: Discussion Questions

A NFA can be in multiple states at the same time but NFAs have the same expressive power as DFAs.

a) Does this mean that NFAs and DFAs are always equally good at solving a particular problem?
b) Discuss the relative efficiency of DFAs and NFAs from the point of view of designing a FA to solve a problem and in realistically implementing such a FA using circuits or other hardware.

ACTIVITY 2: Converting NFAs to DFAs

For each of the following problems design a DFA to solve it, and then design a NFA to solve it and convert the NFA to a DFA.

a) Recognizing a binary string that includes the sub-string “011”.
b) Recognizing a binary string consisting of one or more ‘0’s followed by one or more ‘1’s.
c) Recognizing a string that includes the letter ‘z’ where alphabet A = ‘a’… ‘z’+ ‘ ’.
d) Recognizing the word “six” in a string where alphabet A = ‘a’… ‘z’+ ‘ ’.

Note: It’s OK to use sensible notation on links to represent large numbers of options instead of listing all possibilities.

End of Work Sheet 2