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 6

AIM:
- To explore the notion of undecidability.

You may undertake the work in this worksheet as a group activity; however each student is individually responsible for their own learning. 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 7 of semester.

ACTIVITY 1: Discussion Questions

a) Does the Halting Problem say that it's not possible to create a general algorithm to verify code correctness?
b) Are meta-problems relating to Regular and Context-Free languages always decidable?
c) What is the best way to prove that a language is decidable? Are there any others? How about proving it's not decidable?

ACTIVITY 2: Undecidability

For each of the following problems, identify its complement. When the language or its complement are recognizable, show that this is the case.
a) A_{REX}.
b) EQ_{DFA}.
c) E_{CFG}.
d) You are monitoring a continuous stream of binary data, testing for signs of alien life in the vicinity of the Alpha Centauri system. The binary string "1111" indicates that evidence has been found, meaning that monitoring ceases and the input is accepted.

End of Work Sheet 6