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 8

AIM:

- To understand the concept of asymptotic complexity analysis.
- To understand the concept of Boolean satisfiability.

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 9 of semester.

ACTIVITY 1: Discussion Questions

a) You are tasked with analysing the work of another programming team. They present you with their solution to a problem, which has not been performing as well as expected. You analyse it and realize that it has time complexity 23×4^n where n is a measure of the input size. What else should you check? What advice should you give them?
b) The programming team tells you that their program should manage an input size of around 1000. Is this feasible?

ACTIVITY 2: Boolean Satisfiability

For each of the following clauses, state whether it is Satisfiable. Boolean Satisfiability is covered on p328 of Savage (and other parts of that chapter) and p271 of Sipser.

a) $a \wedge b \vee \sim a \wedge \sim b$
b) $a \wedge b \wedge c \wedge (\sim a \vee \sim b \vee \sim c)$
c) $((a \wedge \sim b \wedge c) \vee (a \wedge b \wedge \sim c) \vee (a \wedge \sim b \wedge \sim c)) \wedge (\sim a \vee (b \wedge c))$

ACTIVITY 3: Complexity Analysis

Since the pre-requisites of this unit are two units that include complexity analysis, it is assumed that all students have a sufficient understanding of this topic to judge the asymptotic complexity of an algorithm. If this is not the case, practice complexity analysis by completing relevant problems in the textbook(s).

Savage: 8.1 on p383 and 8.21 on p385
Sipser: 7.1, 7.2 on p294 and 7.9 on p295

End of Work Sheet 8