Student Number:

Tutorial (Day/Time):

THE UNIVERSITY OF MELBOURNE
SCHOOL OF COMPUTING AND INFORMATION SYSTEMS

COMP90038: Algorithms and Complexity
Mid-semester Test
April 2017

Test duration: 30 minutes.
Reading time: 5 minutes.
Authorized materials: None.

Instructions to students:

- This paper counts for 10% of your final grade.
- There are three parts to the test:

  Part A – 5 $\times$ 1 mark multiple choice questions.

  Part B – 10 marks for short answer questions.

  Part C – 5 marks for writing an algorithm in pseudocode.
- Attempt all questions.
- Please write your answers to the multiple choice questions in the labelled boxes on page 2.
- Please write your answer to each of the short answer / algorithm questions in the ruled boxes below (or next to) the question. If necessary, use the reverse side of any page to prepare a draft answer. Then, copy your draft answer into the appropriate boxes.

Check list for the mid-semester test

- compare the order of growth of functions
- determine the time complexity of a given algorithm, stating your final answer using Big-O / Big-Θ notation (e.g., tutorial questions and Q1/Q3 on the assignment)
- solve recurrence relations using telescoping / substitution
- write an algorithm to solve a particular array processing problem (e.g., Q2 on the assignment)
- trace the path of a particular sorting algorithm (e.g., insertion sort)
- describe the properties of a given sorting algorithm (e.g., insertion sort)
- trace the path of a particular searching algorithm (e.g., sequential search and/or binary search)
- write/trace a brute force string searching algorithm
- explain graph concepts and representation (see tutorial question and definitions from lecture notes)
- trace the path of a particular graph traversal algorithm (e.g., depth first and/or breadth first)
- explain how topological sort works
- write an algorithm to solve a particular graph processing problem (e.g., counting nodes/vertices; using DFS)

Note: all material introduced in the lectures in Weeks 1 - 4 is examinable on the mid-semester test