

THE AUSTRALIAN NATIONAL UNIVERSITY

Mid-semester Exam

Semester 1 - 2006

COMP1200

(Perspectives on Computing)

Writing Period: 45 minutes duration

Study Period: 0 minutes duration

Permitted Materials: None

Maximum Marks: 40
Answer ALL questions

Family Name :

Given Names :

Student Number :

Answer all questions in the space provided in either black or blue pen. This exam is worth 20% of the exam mark and will be marked out of 40. Marks for individual questions are given in square brackets. Students are allowed 45 minutes to complete the exam. Students are permitted to have pens, pencil, ruler, etc. However, no other materials are permitted. If there is insufficient space for you to answer a question, then use the blank pages at the end of this exam paper. Clearly indicate that you are doing this in the space provided for the main answer.

No copy of this paper is to be removed from the examination room by candidates. All copies must be returned to the examiner.

For use by the examiners

Q1.	Q2	Q3	Q4	Q5
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Q6	Q7	Q8	Q9	Q10
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Total Mark/40

Computer Architecture [11 marks total]

1. [3] Write down whether each of the following statements is true or false:

- [1] Boolean logic was named after George Boole, who first defined an algebraic system of logic in the mid 19th century.

Write *True* or *False* _____

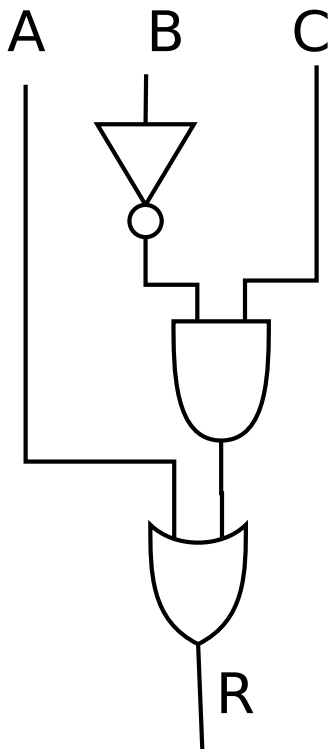
- [1] The program counter in the CPU of a simple computer stores the next instruction to be executed.

Write *True* or *False* _____

- [1] In the layered view of the architecture of a computer system, *logic components* appear **below** *logic gates*.

Write *True* or *False* _____

2. [4] Complete the truth table for the logic diagram below.



A	B	C	R
0	0	0	
0	0	1	
0	1	0	
0	1	1	
1	0	0	
1	0	1	
1	1	0	
1	1	1	

3. [4] Fill in the blanks:

- [1] Claude E. Shannon first used the word *bit* in a 1948 paper. Shannon's "bit" is a portmanteau word (compound word) for _____.
- [1] The bit pattern 10101010 in 8-bit two's complement represents the decimal value _____.
- [1] The value +42 in decimal is represented as _____ in 8-bit two's complement (*show all of the 8 bits*).
- [1] Convert C1 from hexadecimal (base 16) to binary (base 2): _____

Operating Systems [11 marks total]

4. [3] Are each of the following statements true or false?

- [1] In an operating system, there can be more than one process that is executing the same program.

Write *True* or *False* _____

- [1] In an operating system with virtual memory, the total memory used by one process must be exactly the same size as physical memory.

Write *True* or *False* _____

- [1] If an error in the file manager causes the loss of part of a file, this means that the file was not secure.

Write *True* or *False* _____

5. [4] Fill in the blanks.

- [1] The name _____ refers to the design model for a computer that uses a single storage structure to hold both instructions and data.
- [1] In computer networking, TCP and IP are kinds of _____.
- [1] The name for the basic allocation unit used for managing disk space is _____.
- [1] Space-multiplexing is about sharing _____.

6. [4] Explain why a computer will generally complete all of its work more quickly if it uses time-multiplexing. *Hint:* use an example of two processes with and without time-multiplexing, and briefly explain the reasons for the work being done more quickly.

Computation [18 marks total]

7. [3] Are each of the following statements true or false?

- [1] Analysis of algorithms is a very important area of computer science.

Write *True* or *False* _____

- [1] An algorithm with a running time of $O(n \log n)$ is said to be intractable.

Write *True* or *False* _____

- [1] Time complexity and space complexity are normally characterised in terms of the output size.

Write *True* or *False* _____

8. [4] Fill in the blanks.

- [1] A Java compiler converts source code into _____

- [1] In bitmap computer graphics, the _____ is the unit of manipulation.

- [1] An algorithm is an ordered set of unambiguous, executable steps that defines a _____.

- [1] Many people believe that Ada Lovelace was the world's first _____

9. [4] Briefly describe the functional programming paradigm. Give an example of a functional programming language.

10. [3] The compilation process consists of three main stages. Briefly describe what occurs in the first stage.

11. [4] Briefly explain why the problem “I don’t know if my boy/girlfriend really loves me” falls outside the scope of computability theory.

This section is for rough work.