

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	
Q6	Q7	Q8	Q9	Q10	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* true _____

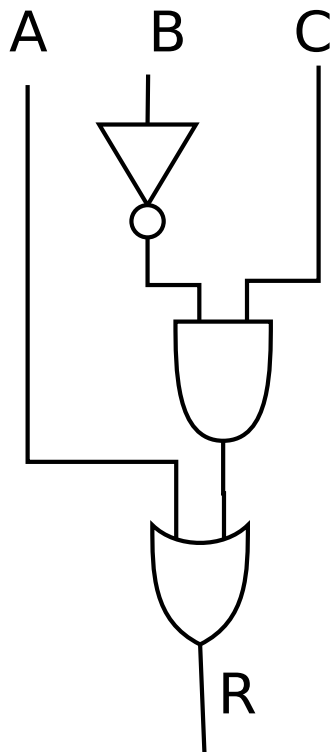
- [1] The program counter in the CPU of a simple computer stores the next instruction to be executed.

Write *True* or *False* false - it is the address of the next instruction _____

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

Write *True* or *False* false - components are above gates. _____

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



A	B	C	R
0	0	0	<u>0</u>
0	0	1	<u>1</u>
0	1	0	<u>0</u>
0	1	1	<u>0</u>
1	0	0	<u>1</u>
1	0	1	<u>1</u>
1	1	0	<u>1</u>
1	1	1	<u>1</u>

v1: 0 1 0 0 1 1 1 1 v2:...

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 _____ binary digit.
- [1] The bit pattern 10101010 in 8-bit two's complement represents the decimal value 86.
- [1] The value +42 in decimal is represented as 00101010 in 8-bit two's complement (*show all of the 8 bits*).
- [1] Convert C1 from hexadecimal (base 16) to binary (base 2): 1100 0001

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* true

- [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* 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* false

5. [4] Fill in the blanks.

- [1] The name von Neumann [machine/computer] _____ 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 protocol _____.
- [1] The name for the basic allocation unit used for managing disk space is block _____.
- [1] Space-multiplexing is about sharing memory or storage _____.

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. Each process typically*

spends some time computing and then some time waiting for I/O. With time multiplexing, the IO waiting time for one process need not be wasted because another process can be doing some of its computing in the waiting time.

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* true _____

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

Write *True* or *False* false _____

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

Write *True* or *False* false _____

8. [4] Fill in the blanks.

- [1] A Java compiler converts source code into byte code or machine code or instructions

_____.

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

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

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

_____.

9. [4] Briefly describe the functional programming paradigm. Give an example of a functional programming language. The programmer describes... An example of a language is Haskell (or

Lisp).

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

answer

Lexical analysis.

The source program is broken into a stream, of lexical tokens, and it generates error messages if errors are found.

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. There is no algorithm tyhat can be used to find the

This section is for rough work.