UNIVERSITY OF EDINBURGH

COLLEGE OF SCIENCE AND ENGINEERING

SCHOOL OF INFORMATICS

Computer Literacy 1

Resit Examination

Date: 15 August 2007
Time: 9:30 – 11:00 pm (one and a half hours)
Place: [xxx]

Board of Examiners
Chair: Michael O'Boyle
External Examiner: Robert Irving

Instructions to Candidates

Attempt **ALL** questions in part 'A' and **ONE** question from part 'B'.

Marks for questions are indicated in brackets after each question. Each question is worth 20 marks and the total for the exam is 100.

Candidates in the third or later year of study for the degrees of MA(General), BA(Relig Stud), BD, BCom, BSc(Social Science), BSc(Science) and BEng should put a cross (×) in the box on the front cover of the script book.

Part "A"

Answer ALL FOUR questions from this section

1. **(a)** What factors limit the development of faster and faster PCs and how are manufacturers getting around these? [4 marks]

(b) Alan needs to dictate a table of numbers to Barbara over a very noisy phone line. Alan tends to speak very quickly. The table has several columns and the last number in each column is the total for that column. Using what you know of communications protocols describe how Alan and Barbara might arrange the conversation so that the numbers are received completely and correctly. [6 marks]

(c) Imagine you are the parent of children aged 10 and 12. What guidelines would you give them to ensure their safety when using the Internet? [3 marks]

(d) Describe three ways of making payment from Internet-based suppliers. What are the benefits and drawbacks of each? [3 marks]

(e) Graphical User Interfaces (GUIs) are the most common way in which users interact with operating systems or computer applications. What would you look for in a well-designed and well-constructed GUI? [4 marks]

2. **(a)** Dismantling and re-assembling the brakes on a car is a tricky operation and could cause an accident if done incorrectly. Explain how you might use computer graphics and other techniques you have encountered in CL1 to reduce the chance that an engineer will make a mistake when replacing the brakes on an Aston Martin. What problems do you envisage in this approach compared to, say a printed manual with photographs? [4 marks]

(b) State some forms of malicious computer-related behaviour that a firewall will <u>not</u> protect you from. [3 marks]

(c) I am about to replace Windows XP on my 3 year old desktop machine with the much larger and more demanding Windows Vista and I am concerned that I might have problems. What are the most likely signs that my machine is having problems with Vista and what can I do about it? [3 marks]

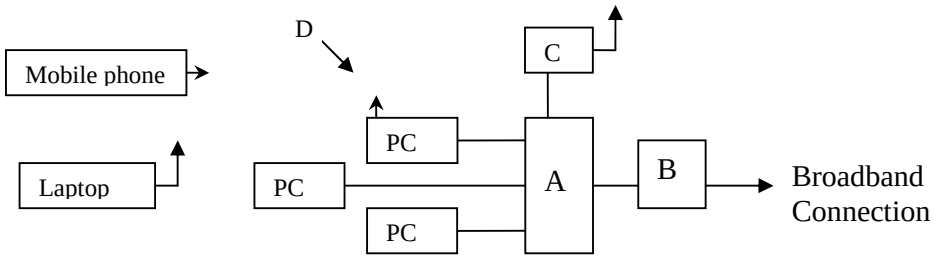
(e) Why might I want to use the following in construction of a Web site?

i. Cascading Style Sheets
ii. Java
iii. XML [3 marks]

(Question 2 continues on the next page)

2. **(f)** What is the main problem with *symmetric key* encryption systems and how do public key systems avoid this? [2 marks]

(g) My home network is laid out as per the diagram below, connecting three fixed PCs and a wireless-enabled laptop. Periodically I synchronise the contents of my mobile phone with one of my PCs. 'A' – 'C' are small boxes that sit on my desk. 'C' has a short aerial. 'D' is a small attachment plugged in to the USB port of one of the PCs. What are the items 'A' – 'D' likely to be and what are their functions? [5 marks]



3. **(a)** Describe the notion of an embedded computer and give an example. What is the relevance of 'firmware' in this context? [3 marks]

(b) Describe or illustrate the key functions of
i Data mining
ii Geographical Information Systems (GIS) [4 marks]

(c) Give a characterization of analogue values and of digital values, and provide an illustration of each. Give an example of a device that converts between the two types of representation. What are two main advantages of digital over analogue? [5 marks]

(d) What is syntax, and what is semantics? Provide an example of each type. Which is processed by a computer, and why? [4 marks]

(e) Consider the Turing machine specified by the program <1,1,R,1>, <1,0,R,1>. If it begins its computation in state 1 reading a 1, what 'actions' will it perform next? If in state 1 reading a 0? Describe the overall computational behaviour of the machine. [4 marks]

4. **(a)** What is the general notion of an effective procedure? [3 marks]

(b) What is a bit? What is a byte? How many different possibilities can a byte express? [4 marks]

(c) What is the computational paradigm in AI? What is the mind/program analogy and why is it important? [4 marks]

(d) In the context of genetic algorithms, name and describe the two basic operators that transform the chromosomes. How do genetic algorithms utilize the biological notion of 'survival of the fittest'? [4 marks]

(e) What is the biological inspiration for connectionist networks? Describe three fundamental differences between connectionist networks and classical computation. Name an area in which connectionist style computation is particularly successful. [5 marks]

Part "B"

Answer ONE question only from this section

B1. We now live in an 'Information Age' and many aspects of human culture are undergoing radical change. As with most changes, there are both benefits and drawbacks. Write an essay discussing what you take to be the most important spheres of impact of information technology, and the primary positive and negative effects. What factors and considerations are required to reduce the negative aspects of change, and for us to make an informed choice about the way we live and the direction in which society is going? [20 marks]

B2. "To err is human; to really mess things up requires a computer". There are many ways in which errors can arise in computer programs or in which computer-based projects can go wrong. Use what you have learned in the course plus your own reading and experience to explain how one ensures that a large piece of new software performs as intended and is delivered on time and within budget. [20 marks]

B3. Making explicit use of material covered in the course, write an essay discussing the basic phenomenon of linguistic communication, including attempted definitions and models, and the role of computers *both* in understanding *and* facilitating this phenomenon. Be sure to include discussion of the basic strengths and weaknesses of computers in processing human language. [20 marks]

B4. TradCast is an old-fashioned family firm that makes high quality metal castings. It hardly uses IT at all and its accounts and records are on paper. TradCast has just been bought by Newform, a rather more modern company based 120 miles away which uses IT more than TradCast but still only for its accounts and for issuing invoices – sales are handled over the phone. A condition of the takeover was that TradCast's workforce be kept on for three years. You are a senior manager at Newform and you think that a) TradCast and Newform will have to combine their sales and administration procedures or TradCast will drag Newform down, and that b) Newform could be doing much more with IT than it is. Your Board has asked you to report on the possibilities and the likely problems and to give an outline on how you would proceed. Describe what would be in your report. – you may invent additional detail if this helps illustrate your points. [20 marks]