UNIVERSITY OF EDINBURGH

COLLEGE OF SCIENCE AND ENGINEERING

Computer Literacy 1h

Resit Examination
<mark>Specimen Solutions</mark>

Board of Examiners
Chair: M.R. Jerrum
External Examiner: R. Dyckhoff

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 and the total for the exam is 70.

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 tick (√) in the box on the front cover of the script book.

Part "A"

Answer ALL questions from this section

1. (a) List four functions of an *operating system.* [2 marks]
I'm prepared to accept a wide definition of what the operating system is here, so any of task scheduling, device management and I/O, bootstrapping, resource (e.g. virtual memory) management, the file system, maintaining configuration information, the GUI, etc. [Recycled question].

(b) If a page of text can be stored in a kilobyte, approximately how many pages of text can be stored on a CD-ROM? [2 marks]
CD-ROM capacity is approximately 650 Mb = 650,000 Kb (pages). 1 mark for knowing the size of a CD-ROM, 1 for being able to convert Mb to Kb.

(c) Identify four of the features you would expect of a good computer application. [2 marks]
Straight from the slides. Points I was expecting: Matched to purpose; Intuitive for novice; Supportive of advanced user; Unobtrusive; Tolerant of experimentation, fail-safe; Self-tutoring; reliable. Possibly: Easy to install; Compatible with many data formats; Helps you work better ...[Recycled Question]

(d) Explain where you would need *lossless* data compression and why in some instances *lossy* data compression would be more appropriate. [2 marks]
Lossless: Anything that needed to be recovered exactly – programs, text files etc.; Lossy: anything where an approximation would do in the interests of saving space: photographic images, music tracks.

(e) One function of a DBMS is to maintain data integrity. What problems would you expect when using a database that did not show this property? [2 marks]
There would be inconsistencies in the way data was represented – a search might or might not find the desired item depending on how it was entered. If a database loses integrity it will drift further and further away from a true representation of the world and searches will generate wrong, missing and inconsistent results [Recycled Question]

2. (a) Describe the nature and function of a *mainframe* computer. [2 marks]

Large corporate central machine; fixed pattern of work e.g. payroll, reconciliation of trading positions, transaction processing. Centralised, multi-function, possibly company-critical.

(b) A word processing application is a powerful tool for any author. Describe some of the benefits and problems of using a word processor when writing creatively. [4 marks]
Benefits: takes care of the mundane processes and allows the author to concentrate on creativity. Documents look professional; they can be added to incrementally without rewriting; Spell checkers can spot errors; Documents can be enlivened with visual aids or material from other sources. Problems:

Documents can look <u>too</u> professional (creates spurious belief in the content); it's too easy just to type without thinking about structure; if not backed up you can lose the lot; there's no change history; visual tricks can overwhelm the content.

(c) Write down a list of guidelines you would make sure an 11-year-old girl knew before allowing her to use an Internet chat-room unattended.

[4 marks]

- *I will not give out personal information*
- *I will never tell anyone my password*
- *I will tell my parents right away if I come across something I don't like*
- *I will never agree to meet someone without checking*
- *I will never send a person my picture*

(this is an actual list of items written down by a class of American children which I used in lectures. I thought it was excellent)

3. **(a)** Describe some of the uses and possibilities of computer graphics in the visualisation of data in 3-D. [4 marks]
It allows the representation of huge amounts of data in a way that human eye and brain is good at interpreting. It allows the direct visualisation of conceptually difficult ideas difficult to represent in any other way. It allows proper representation of distance (as opposed to 2-D), it provides a less abstract view of the problem. It allows display of special effects that would be impossible or impossibly expensive in the real world. It allows visualizing of prototypes without having to build them.

(b) Describe some of the ways in which e-business technologies can link together different aspects of a complex business such as an airline. [4 marks]
The simplest examples are email and web pages but the lecture covered the idea of a call centre with access to customer records, sales information feeding into the marketing department, linking of legacy and modern systems, data storage, groupware ...

(c) Describe two ways in which data can be input into a computer other than a keyboard and say why this is an important issue given future trends in computers. [2 marks]
voice; stylus; haptic glove; mouse. It is important because the trend is towards computers that are too small to have proper keyboards.

4. **(a)** What is *identity theft*? [2 marks]
The process where a predator can acquire and use knowledge about you to pretend to be you. This is possible because you are 'defined' by the information stored about you on computers.

(b) Computer crimes leave trails of 'electronic footprints'. Explain. [2 marks]

Almost all interaction with computers is recorded in some way – log files record time and date of login and logout, applications used , file and databases read and updated. Email is recorded as it is routed through the network and there are ISP and phone records. The analogy is with muddy footprints at the crime scene.

(c) What is an *intranet*? [2 marks]
A network and information sources belonging to some organisation, protected behind a firewall and to which access is strictly controlled.

(d) What is meant by *ubiquitous broadband*? [2 marks]
The idea that we live in a society populated largely by 'always-on' devices communicating at high speeds and widely available geographically – 3G phones on the person, cable or DSL internet at home, public browser stations in libraries ,airports and street kiosks and so on.

(e) Give four examples of everyday applications of computer and communication technology which if taken together could present a detailed trace of our daily activities. [2 marks]
Mobile and fixed phones, credit cards, ATMs, CCTV cameras, smart in-car navigation/information systems, swipe cards, username-based computer use ...

5. (a) "Computer network" and "phone network", "fibre-optic" and "twisted-pair" are used to describe different services and network technologies. Explain these distinctions and why they are no longer entirely valid. [6 marks]
Traditionally computer networks carry data and phone networks carry voice. Fibre-optic cables are associated with long-haul "WAN" or backbone networks transmitting data at the highest available speeds over long (e.g. intercontinental distances). Twisted-pair is typical of the technology used to distribute network services over smaller areas (buildings, campuses) and ultimately to the desktop. As technology advances these distinctions become blurred – fibre-optic is now used to wire up buildings and twisted-pair now carries data at speeds once regarded as 'backbone' speeds. Phone networks increasingly use computer network technology and computer networks are used to carry voice.

(b) Briefly describe three different forms of wireless network used for computer-based communication. [3 marks]
802.11x WiFi – used over medium distance at 10 Mbit/s Ethernet speeds for networks of PCs; Mobile phones with inbuilt modems; Bluetooth – used essentially as a replacement for wired connections over distances of a few feet.

(c) What is a *modem*? [1 mark]
Usually taken to be a device for connecting the digital output of a computer to an analogue network (e.g. dial-up). [The water is muddied by cable and DSL modems but any sensible definition will do]

Part "B"

Answer ONE question only from this section

B1. The IT Society is a double-edged sword. Discuss how the law, the markets, the nature of computers and networks and norms of behaviour combine to create opportunities and threats to our way of life and how these are kept in balance.

[20 marks]

The entire last lecture, called "The IT Society ... or the two-edged sword" was about this. Benefits: access to information, access to people, choice of work patterns, new forms of experience, new products, new markets, business efficiency (reduced costs, more choice), breakdown of borders. Problems: use of information to control people, pace of life, information overload, computer crime. Balance: Laws on hacking, stalking etc., data protection (but also R.I.P.). Norms – people usually conform to acceptable behaviour (but Internet anonymity erodes this). Nature – real-world has geography, Internet does not. In the real world the red-light district is across town; on the Internet it is in your face. Control – get people where they require real-world resources (e.g. credit card numbers). Free speech v. censorship. Information as a weapon. Copyright protects both music artists and restrictive industries, etc. etc.

B2. What is computer literacy? Describe the insights a computer-literate person could apply if asked to comment on computer-related problems and situations in personal or business life. [20 marks]

This should be interesting. Things they should be able to come up with: The ability to converse about a topic in computing and know how to find out more; Some technical understanding; An appreciation of the limitations of their knowledge and that problems usually include elements of human, business, computer and other specialisations. Some understanding of how to deconstruct a problem and think about specifying it properly; An awareness of some of the common sources of problems; An awareness of the benefits and problems of IT in society. This would be extremely easy to answer at a mundane level but to get significant marks they'll have to do more than just repeat the lecture titles.

B3. Browsing news media might lead the reader to believe that advances in communications have only brought society more pornography, paedophilia and opportunities for criminal activities via spam. Present a case that this is not true and argue for the benefits. You may wish to draw on your own experience and what you have read in the press. [20 marks]

News is biased; Good news is seen as boring and doesn't sell The result is a distorted view of the world in which rare but sensational items such as pornography are seen as the norm. In fact positive changes and benefits happen incrementally and become accepted without being noticed. Control and regulation lag behind advances in technology but society adjusts. Arguments could be made such as the usefulness of mobile phones, computer networks

whether local, national or international, access to information generally;
Commercial opportunities, business efficiency, new information-based products.

B4. As mobile phones, PDAs and laptop computers continue to converge, they can provide mobile offices to suit every budget. Outline the advances that have made this possible, some likely future developments and some of the benefits and pitfalls of the large-scale adoption of this technology in society.   [20 marks]
The machines themselves – smaller, lighter, cheaper, LCD screens, low power consumption; Availability of the mobile phone network and suitable modems; Applications and peripherals – WAP, in-car fax machines, GPS-based information services. Still to come – G3 and adequate speed; wearables, Bluetooth (again), voice input and output (no keyboards). Benefits are constant availability of information irrespective of location and permanent accessibility of the person. Drawbacks include exactly the same things! and also information overload, cyber-stalking, security breaches. Benefits are increased business effectiveness.