UNIVERSITY OF EDINBURGH

COLLEGE OF SCIENCE AND ENGINEERING

SCHOOL OF INFORMATICS

Computer Literacy 1

Resit Examination

SOLUTIONS

Date: 26 August 2005
Time: (one and a half hours)
Place:

Board of Examiners
Chair: M.R. Jerrum
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 in part 'A' is worth ELEVEN marks and the total for the exam is 75.

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 questions from this section

1. (a) My document scanner can scan in 24-bit colour at resolutions from 75 dpi to 2400 dpi.

i) What is meant by the terms ‘resolution’ and ‘dpi’ ? [1 mark]

Resolution is the number of pixels per unit area that the device can generate (scanners) or display (printers and monitors). Dpi stands for “dots per inch” and is a measure of device resolution.

ii) How much data will this scanner generate scanning a 5 inch * 4 inch photograph, full colour at 300 dpi? [2 marks]

*20 * 300 * 300 * 3 = 5,400,000 bytes*

iii) Why might I want to scan some or all of a photograph at

a. 75 dpi? [1 mark]

A low resolution scan for a web page – no point in having lots of data in the image if it can’t be displayed

b. 2400 dpi? [1 mark]

Where either a large, detailed or accurate image is required or where a small section of a bigger picture is of interest.

(b) Compare and contrast the factors I need to consider when making a choice whether to buy

- an ordinary (i.e. deskside or desktop) computer
  or
- a laptop computer

for some typical tasks at home and when studying. [4 marks]

Defining feature of a laptop is portability so weight and battery life are factors. Everything else is secondary (e.g. display size and ergonomics) and they cost more. If you are likely to use the machine 8 hrs/day then you may want a full keyboard and screen

(c) Compare and contrast the processes of preparing a document with visual (WYSIWYG) formatting versus using a *markup language*. [2 marks]

Basically something like HTML or TeX versus MS Office. With a WYSIWYG editor you see every change as you make it whereas with a markup language you only see the result once it has been laid out. With a markup language you give the application instructions as to the content and leave it to work out details of style. Generally with a WYSIWYG language you’re on your own.

2 (a) Name two aspects of real-world scenes that are difficult to reproduce in the computer and explain why [2 marks]

Hair (lots of little elements) water (dynamic elements); trade-offs between implementation of physical laws and modelling of complex 'natural' behaviour

(b) What are *cookies* and what security issues do they present ? [2 marks]

Small pieces of information exchanged between browser and web server to maintain 'state' (continuity). They can contain personal information that can be collated and abused.

(c) In what ways do packet-switched and circuit-switched networks differ? [2 marks]

Packet-switching involves the independent routing of numerous packets. Circuit-switching involves the setup and possible routing of a 'pipe' down which all subsequent data flows. The circuit switched network is logically (though not necessarily physically) akin to a patched wired telephone exchange.

(d) What is the "World-Wide-Web"? How is the Web different from the Internet? [2 marks]

It is a world wide collection of linked content supported by many authors on many servers, served to users via HTML, XML etc. and browsed via Web browsers. The Internet is the infrastructure supporting this and many other protocols and services. The Web is one such service.

(e) What is distributed computing? Give an example. [2 marks]

It is the splitting up of a task and the distribution of that task amongst multiple computing entities. An example would be SETI@home or anything that employs a task farm e.g. many high performance computing systems.

(f) What technologies support large scale e-Science ? [1 mark]

High performance processing, large data stores, high-speed networks, networks of sensors …

3 (a)

(i) What applications are likely to develop around *Natural Language Processing*? [3 marks]

Speech recognition (answering phone calls, car dashboards), speech generation (ditto) e.g. hotel booking, travel tickets, voice Web portals, translation …

(ii) What aspects of Natural Language Processing are 'difficult' ? [1 mark]

Segmenting phonemes into words, context of phonemes, natural variety in voice and accent, idioms, ambiguity ..

(b) What environmental benefits follow from the increased use of I.T.?
[3 marks]

Reduction in travel, reduction in use of paper, efficient design (e.g. of engines), increase in productivity generally

(c) What is an algorithm? Give an example from daily life. [2 marks]

A formalised and exact description of how to perform a task. Recipes, knitting patterns

(d) Give two ways in which computers and people solve problems differently.
[2 marks]

Computers solve problems sequentially whereas humans work more in parallel. Computer calculation is in terms of absolutes where humans can compute using probabilities ….

4 (a) What is *metadata*? Give an example. [2 marks]

Metadata is information about information. An example would be a library catalogue record.

(b) What aspects of a Web site can be manipulated in order to affect its prominence when searched for through a search engine such as Google?
[2 marks]

Ensuring key words occur at the start of the page (within reason); using HTML metadata instructions to give search engines some idea about content; updating the page frequently; arranging for it ot be referred to from other pages; paying a search engine to give you prominence.

(c) Name two advantages of using Cascading Style Sheets when building web sites [2 marks]

Helps maintain consistent style by allowing mods to be made in one place propagating to all pages. Easier to implement measures for accessibility.

(d) What is the function of the *key* when encrypting or decrypting data? What weakness does the key present in a symmetric key encryption system?
[2 marks]

The key is the string against which the data is encrypted/decrypted. In a symmetric key system the key has to be sent to the recipient in some way which is a vulnerability.

(e) What factors contribute to the cost of ownership of an effective web site?
[3 marks]

Updates and extensions to content, updates to style, new technologies, analysis and application of feedback, bug fixes.

5 **(a)** What are the major barriers to the adoption of e-commerce? Explain how the Consumer Credit Act (1974) provides some protection when shopping on-line. [3 marks]

Lack of trust on behalf of consumers, lack of legal frameworks that can reduce fraud and sort disputes; slow networks; high-profile issues such as identity theft and phishing. CCA provides protection to buyers when using credit facilities such as credit cards – credit card agency is jointly liable with supplier.

(b) What features are provided by a Database Management System (DBMS) ? [2 marks]

Data entry and verification; maintenance of a database schema into which data is entered; accreditation; multi-user access to one corpus of data; provision of facilities for creating and executing queries; report generators …

(c) In what ways does the operating system support interaction between human and computer? [2 marks]

Pretty much all of an operating system does this so you could mention the GUI (we'll count this as part of the o/s), maintenance of mouse and keyboard, the file system, controlled execution of tasks, security etc. Any sensible answer accepted if accompanied by some 'hook' to how it assists the user.

(d) What do you understand by the term *communications protocol*? Illustrate your example using some aspect of communication between two computers. [2 marks]

It is the set of rules that govern some aspect of how two entities communicate. Examples would be error recovery or flow control.

(e) Which features of a spreadsheet support experimentation and the asking of "what-if?" questions? [2 marks]

The ability of a spreadsheet to update an entire sheet as figures are entered or altered; the "goal-seek" function; the ability to link a number to an Active-X control and observe the effect graphically. Most features in fact and demonstration of awareness of this gets the marks.

Part "B"

Answer ONE question only from this section

B1. Describe some of the factors that you would need to consider to ensure that an I.T. project went according to plan or which, if neglected, could cause a project to fail, go over budget or run late? [20 marks]

(lecture refers). A proper definition of the problem in terms of IT, skills, people, business, relationships. Understanding of the existing situation and the environment in which the project is being launched.

B2. Describe the strengths and weaknesses of different technologies and methods that can be used to find information on the Internet. How would you assess the reliability of the information you find? [20 marks]

Search engines: good for lots of information, specific information, info about people and organisations, don't cover the whole web, return sites of unknown quality, don't have access to databases, ambiguous searches can produce irrelevant results. Advanced search features and incremental searches can help when used appropriately. Metasearch engines: increased coverage of web, quicker than using individual engines serially, innovative interfaces Commercial ones don't include academic gateways, not use advanced search features of individual search engines, results are slower than individual engines Directory-based searches: evaluated sources, alternative to keyword searching, can be slow to find a site, can get few hits Gateways and portals: as for directory-based search engines. Reliability: author credentials, date information was posted, URL, structure and layout of site, membership of classified directory, links to/from other web sites, contact address …

B3. Describe the wireless technologies that could be used

- in a hospital
- by a wildlife documentary team on location

and the potential benefits and problems they present [20 marks]

1. Technologies – WiFi laptops in wards etc., Bluetooth to PDAs, IR to print. Benefits – bring full medical records to bedside and be able to update them instantly and make available to all staff. Problems – data entry (how to include drawings, X-rays etc., battery life, security, maintenance, interference with sensitive equipment

2. Technologies – GPS, Satellite, radio. Benefit – communication on location, flexible planning, longer-term filming is possible, tracking animals with radio tas and sensors; Problems – battery life, reliability

B4. Describe some normal and some undesirable forms of social or commercial relationships that occur between people over the Internet. In what ways do these relationships differ from the equivalent relationships in the 'real world'?

[20 marks]

Normal social or commercial relationships – friend-friend, boyfriend-girlfriend, interest group, workplace, team .. Differences are that they are not face-to-face (though may be supported by real-world interaction or audio and video) and body-language or social status cues are not always available and have to be simulated by smileys etc. Distance however disappears (other than the effect of time zones) so relationships can be conducted over a considerable distance e.g. if a couple are separated or a business team distributed world-wide.

Undesirable relationships would include predation, harassment or stalking where anonymity is a factor as is access to people. Paedophiles would not normally get direct 1:1 access to children but can in chat rooms. Scammers gain access to millions of people via spam.

The question provides an excuse to talk about most aspects of internet-mediated interaction between people and any sensible comparisons will get marks.