

THE UNIVERSITY OF AUCKLAND

SUMMER SEMESTER, 2009

Campus: City

COMPUTER SCIENCE

Mastering Cyberspace: An Introduction to Practical Computing

(Time Allowed: TWO hours)

NOTE:

You must answer **all** questions in this exam.

No calculators are permitted

Write your answers in the space provided.

There is space at the back for answers that overflow the allotted space.

Surname	Sample
Forenames	Answers
Student ID	
Login (UPI)	

	Question	Mark	Out Of
1	Hardware and Software		14
2	Internet		16
3	Programming using Python		10
4	Spreadsheets		10
5	XHTML and CSS		10
6	Databases		10
7	LaTeX		10
8	Digital Images & Vector Graphics		6
9	AI		6
10	History and Social Issues		8
	TOTAL		100

CONTINUED

1. Hardware and Software (14 marks)

(a) Name 3 operating systems.

(i) Windows Vista, Windows XP

(ii) Linux

(iii) Mac OS

(3 marks)

(b) What is an operating system? Give a brief definition.

Low-level software that allows you to use the system

- Default interface when no application is running
- Manages the system: CPU, memory, HD, ...
- Does all the direct interaction with the hardware (using drivers)

(2 marks)

(c) Name 3 modular components that can be found inside a computer's system unit.

(i) Motherboard

(ii) Power Supply

(iii) Hard drives, cooling fans ...

(3 marks)

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(d) Which decimal number does the binary number 1101 correspond to?

13

(2 marks)

(e) What is free software?

- Freedom to use and study the work
- Freedom to copy and share the work with others
- Freedom to change the work
- Freedom to distribute changed and therefore derivative works

(2 marks)

(f) Given the following advertisement, what is the size of the primary memory?

Intel® Core 2 Quad Processor Q6600 2.4GHz
Genuine Windows® XP Home Edition
2GB DDR2 SDRAM at 800MHz
750GB SATA
Blu-ray optical drive
21" LCD Flat Panel
512MB NVIDIA® GeForce 9800 GTX+
Integrated 7.1 Audio

2GB

(2 marks)

CONTINUED

2. Internet (16 marks)

(a) State the name of a protocol used on the Internet and what the protocol is used for.

(i) State the name of a protocol.

TCP/IP

(2 marks)

(ii) State what this protocol is used for.

used for transporting data reliably

(2 marks)

(b) Name two protocols used to **collect** email.

(i) POP3

(ii) IMAP

(2 marks)

(c) What is a forum?

- Message board

- Asynchronous communication tool

- Discussion group

(2 marks)

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(d) What is the term given for “Good Manners on the Internet”?

Netiquette (Etiquette on the Net)

(2 marks)

(e) What does a DNS server do?

- Allows us to associate a human-readable name with an IP address
- DNS server translates domain names into IP addresses

(2 marks)

(f) What is a blogger?

Person that posts entries to a blog

(2 marks)

(g) What prevents unauthorized access to or from a private network?

Firewall

(2 marks)

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3. Programming using Python (10 marks)

- (a) Write a program that asks the user to enter their height in metres. The program should then print out the corresponding height in feet as in the example given below.

The formula to convert metres into feet is as follows:

$$1 \text{ metre} = 3.2808 \text{ feet}$$

If the user's height is more than 6 feet, your program should print the message "You are very tall".

For example, if the user enters 2 at the prompt, the output that is expected from your program is shown below:

```
Enter your height in metres: 2
Your height in feet is 6.5616
You are very tall
```

```
height = float(input("Enter your height in metres: "))
ratio = 3.2808
feet = height * ratio
print ("Your height in feet is ", feet)
if (feet > 6):
    print ("You are very tall")
```

(5 marks)

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- (b) Complete the output produced by the following program when the user enters 5 at the prompt.

```
number = int(input("Please enter a number of generations: "))

grandparent = 0
parent = 1
current = 1
counter = 1

print ("Starting the rabbit experiment:")
while (counter <= number) :
    print (counter, "generation:", current, "rabbits")
    grandparent = parent
    parent = current
    current = parent + grandparent
    counter = counter + 1
```

Please enter a number of generations: 5

Starting the rabbit experiment:

1 generation: 1 rabbits

2 generation: 2 rabbits

3 generation: 3 rabbits

4 generation: 5 rabbits

5 generation: 8 rabbits

(5 marks)

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4. Spreadsheets (10 marks)

All questions in this section refer to the spreadsheet shown below. The table gives a list of people and their travelled miles. The spreadsheet is used to calculate the travel costs and show whether the travel budget of a person was exceeded.

	A	B	C	D	E	F	G	H
1								
2		Travelled Miles				Miles Budget		
3		Person	Miles			15200		
4		Sebastian	22500					
5		Stefan	19800			Price per Mile		
6		Paul	15200			\$3.50		
7		Chris	11500					
8		Ali	1200					
9		Sunil	500					
10								
11								
12				Miles	Cost		Name	
13				22500	\$78,750	Over Budget	Sebastian	
14				19800	\$69,300	Over Budget	Stefan	
15				15200	\$53,200	In Budget	Paul	
16				11500	\$40,250	In Budget	Chris	
17				1200	\$4,200	In Budget	Ali	
18				500	\$1,750	In Budget	Sunil	
19								
20			TOTAL	70700	\$247,450			
21								

(a) What is the **best** formula to use in cell D20?

=SUM(D13:D18)

(2 marks)

(b) What is the **best** formula to use in cell D13? Your formula should use a VLOOKUP and examine the “Travelled Miles” table (cells B4:C9) to look up the miles the person in cell G13 travelled. You should ensure that your formula is able to be filled down.

=VLOOKUP(G13,\$B\$4:\$C\$9,2,FALSE)

(3 marks)

CONTINUED

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- (c) Cell E13 contains a formula which calculates the cost of the miles travelled. The price per mile (Cell F6) is multiplied by the travelled miles. What is the **best** formula for Cell E13? The formula must be able to be filled down.

```
=D13 * $F$6
```

(2 marks)

- (d) Cell F13 contains a formula which displays “Over Budget” if the maximum allowed budget (Cell F3) is exceeded by the person’s travelled miles (Cell D13). If the maximum budget is not exceeded, Cell F13 displays “In Budget”. What is the **best** formula for Cell F13? You must use an IF function for this cell and the formula must be able to be filled down.

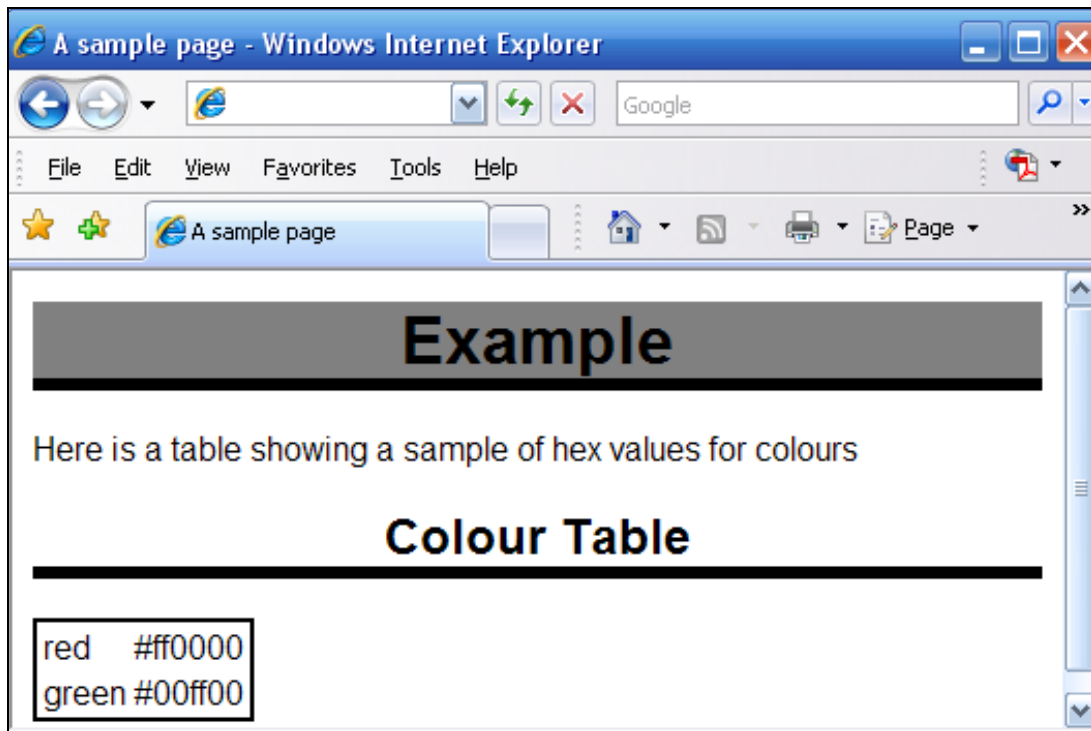
```
=IF( D13<=$F$3,"In Budget","Over Budget")
```

(3 marks)

CONTINUED

5. XHTML and CSS (10 marks)

The following screenshot shows a web page created using XHTML 1.0 strict and Cascading Style Sheets:



The external style sheet that defines the styles used on this page is stored in a file called "styles.css". The contents of the styles.css file are as follows:

```
body {
    font-family: sans-serif;
}
h1 {
    text-align: center;
    border-bottom-width: thick;
    border-bottom-style: solid;
    background-color: gray;
}
h2 {
    text-align: center;
    border-bottom-width: thick;
    border-bottom-style: solid;
}
.chart {
    border-width: thin;
    border-style: solid;
    border-color: black;
}
```

ID.....

Complete the XHTML code below so that it produces the output shown in the previous page. You **must** use the styles defined in the `styles.css` external style sheet and may not define any new styles.

```
<?xml version="1.0" encoding="utf-8"?>
<!DOCTYPE html PUBLIC
"-//W3C//DTD XHTML 1.0 Strict//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<html>
```

```
<head>
<title>A sample page</title>
```

```
<link rel="stylesheet" href="styles.css" type="text/css"></link>
```

```
</head>
<body>
<h1>Example</h1>
<p>Here is a table showing a sample of hex values</p>
<h2>Colour Table</h2>
<table class="chart">
<tr><td>red</td><td>#ff0000</td></tr>
<tr><td>green</td><td>#00ff00</td></tr>
</table>
</body>
```

```
</html>
```

(10 marks)

CONTINUED

ID.....

6. Databases (10 marks)

The following relationship diagram is used by all parts of this question:



(a) What is a foreign key?

A field that relates to the primary key in another table

(2 marks)

(b) Given the relationship diagram shown above, state the primary key(s) and foreign key(s) (if any) of the **Plays** table.

Primary Key(s):

MovieID, ArtistID

Foreign Key(s):

MovieID, ArtistID

(2 marks)

(c) What type of relationship (e.g. one-to-one, one-to-many, many-to-one) exists between the Plays table and the Movies table?

many-to-one

(2 marks)

CONTINUED

ID.....

(d) Is it possible for an artist to play in more than one movie?

Yes.

(1 mark)

(e) Give an SQL statement which displays the titles of all movies which were made in the year 2000.

```
SELECT title  
FROM movies  
WHERE year = 2000;
```

(3 marks)

CONTINUED

7. LaTeX (10 marks)

Write the LaTeX code that will produce the following output:

1 The rabbit problem

1.1 Description and Solution

- Fibonacci described a problem of how fast the population of rabbits would grow if they mate under perfect circumstances.
- The number of rabbits after n months can be calculated with one of the following formulae:

$$F(n) = F(n-1) + F(n-2) \quad (1)$$

or

$$F(n) = \frac{p^n - (1-p)^n}{\sqrt{5}} \quad (2)$$

where p is the **Golden Ratio**.

The following commands have been included as a reference. You will not need to use all of these commands. Note that the basic document structure has been completed for you.

<i>Normal commands</i>	<i>Environments</i>	<i>Math mode commands</i>
<code>\emph{}</code> <code>\section{}</code> <code>\subsection{}</code> <code>\large</code> <code>\textbf{}</code> <code>\title{}</code> <code>\author{}</code> <code>\date{}</code> <code>\maketitle</code>	<code>itemize</code> <code>enumerate</code> <code>verbatim</code> <code>flushright</code> <code>center</code> <code>quote</code> <code>displaymath</code> <code>equation</code>	<code>\sum_{}^{\{}}</code> <code>\frac{}{\{}}</code> <code>\sqrt{\{}}</code> <code>\geq</code> <code>\pi</code> <code>\ldots</code> <code>^</code> <code>—</code>

```
\documentclass[a4paper]{article}
\begin{document}
```

\section{The rabbit problem}

\subsection{Description and Solution}

\begin{itemize}

\item Fibonacci described a problem of how fast the population of rabbits would grow if they mate under perfect circumstances.

\item The number of rabbits after n months can be calculated with one of the following formulae:

\end{itemize}

\begin{equation}

$$F(n) = F(n-1) + F(n-2)$$

\end{equation}

or

\begin{equation}

$$F(n) = \frac{p^n - (1 - p)^n}{\sqrt{5}}$$

\end{equation}

where p is the **\textbf{Golden Ratio}.**

\end{document}

(10 marks)

CONTINUED

8. Digital Images and Vector Graphics (6 marks)

- (a) Name *one* compression algorithm which is best for graphics and *one* which is best for photos.

Best for graphics: **GIF, PNG**

Best for photos: **JPEG**

(2 marks)

- (b) State *two* advantages of vector graphics.

(i) **Very small memory requirements**

(ii) **Memory independent of the image size, Scale to any size without loss of quality**

(2 marks)

- (c) How many **bytes** are required for an 8 colour image, 2 pixels wide and 4 pixels high?
Show all your working.

8 colours need 3 bits per pixel

Bits = 3 x 2 x 4
(bits x width x height)

= 24 bits

Bytes = 24 / 8 (There are 8 bits in a byte)
= 3 bytes

(2 marks)

9. Artificial Intelligence (6 marks)

(a) What is strong AI?

A computer that is self-aware and intelligent.

(2 marks)

(b) Describe the Turing Test for Artificial Intelligence.

A judge has to decide by chatting via a black box to a computer and a human being who of them is the computer. If the judge is miss leaded, then the computer is intelligent.

(2 marks)

(c) List 2 problems which are solved today by weak AI computer programs.

(i) **Face Recognition**

(ii) **Winning the chess world championships.**

(2 marks)

10. History and Social Issues (8 marks)

(a) What are the 4 forms of malicious software?

(i) **Logic Bomb**

(ii) **Trojan**

(iii) **Worm**

(iv) **Virus**

(2 marks)

(b) Do you think it is advantageous to be anonymous on the Internet? Explain your answer.

Any answer is acceptable so long as it is backed up with a good explanation.

(2 marks)

(c) What was the first spreadsheet program available for personal computers? For which brand of computer was it available?

VisiCalc on Apple II

(2 marks)

ID.....

(d) Assign the following people to their companies:

- Steve Jobs
- Paul Allen
- John Warnock
- Larry Page
- Adobe
- Google
- Microsoft
- Apple

Steve Jobs: **Apple**

Paul Allen: **Microsoft**

John Warnock: **Adobe**

Larry Page: **Google**

(2 marks)

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- Overflow Sheet 1 -

Write the question number and letter next to your answer. You must ALSO indicate in the allotted space that you have used the overflow sheet.

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- Overflow Sheet 2 -

Write the question number and letter next to your answer. You must ALSO indicate in the allotted space that you have used the overflow sheet.

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- Overflow Sheet 3 -

Write the question number and letter next to your answer. You must ALSO indicate in the allotted space that you have used the overflow sheet

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