

THE UNIVERSITY OF AUCKLAND

SUMMER SEMESTER, 2013

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 in this booklet.

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		15
2	Internet		15
3	Programming using Python		12
4	Spreadsheets		14
5	XHTML and CSS		12
6	AI and Social Issues		8
7	Databases		12
8	LaTeX		12
	TOTAL		100

CONTINUED

1. Hardware and Software (15 marks)

(a) What does each of the following acronyms stand for?

(i) RAID: **Redundant Array of Independent Disks**

(ii) USB: **Universal Serial Bus**

(iii) ROM: **Read Only Memory**

(3 marks)

(b) Name **four** components which can be found inside a computer's system unit.

Motherboard
Hard Disk Drive
CD Drive
Power Supply
CPU
Cooling Fan
Expansion Cards

(4 marks)

(c) Name **two** types of printers.

(i) **Laser**

(ii) **Dot Matrix**

(2 marks)

(d) Give **two** examples of system software.

Operating System
Device drivers
Diagnostic and maintenance tools

(2 marks)

(e) Who was the founder of the Free Software Foundation (FSF)?

Richard Stallman

(2 marks)

(f) What binary number is equivalent to the decimal number 22?

10110

(2 marks)

2. Internet (15 marks)

(a) What do LAN and WAN stand for and what is the main difference between them?

LAN: **Local Area Network**

WAN: **Wide Area Network**

Main Difference: **LAN only operates within a 1 kilometre radius whereas WAN operates over distances that are more 1 kilometre.**

(3 marks)

(b) What are POP3 and IMAP used for and what is the difference (if any) between them?

POP3 and IMAP are used for receiving email.

The difference between them is:

- POP3 downloads the emails to the local computer and deletes them from the server after the download. Previous emails can be read without logging into the Internet.

- IMAP leaves the emails on the server and you must be logged into the Internet to be able to view previous emails.

(3 marks)

(c) Is it possible to view the history of wiki pages? Please explain your answer briefly.

Yes. A list of what has been added, deleted or changed on the Wiki page, when the addition/deletion/change was made and who made the change can be easily viewed by clicking on the "History" link.

(3 marks)

(d) What does HTTP stand for and what is it used for?

HyperText Transfer Protocol

HTTP is used to transfer hypertext pages over the web.

(3 marks)

(e) What does WWW stand for and what is it?

World Wide Web

WWW is a set of web pages that can be accessed over the Internet using HTTP.

(3 marks)

3. Programming using Python (12 marks)

- (a) Write a program that calculates and displays the area of a triangle. The prompts and output must be formatted as per the two examples below.

At the beginning, the user is asked to enter the base and height of the triangle **in metres**. The user may enter these two values with a decimal point.

The area of a triangle is half of the base multiplied by the height.

If the area is over 1 square kilometre (1,000,000 square metres) then it is displayed in square kilometres, otherwise it is displayed in square metres.

Example 1: If the user entered **4000** for the base and **3000** for the height, the output that is expected from your program is shown below:

```
Enter base (metres): 4000
Enter height (metres): 3000
Triangle area is 6.0 square kilometres
```

Example 2: If the user entered **10** for the base and **2.5** for the height, the output that is expected from your program is shown below:

```
Enter base (metres): 10
Enter height (metres): 2.5
Triangle area is 12.5 square metres
```

```
base = float(input("Enter base (metres): "))
height = float(input("Enter height (metres): "))
area = base * height / 2
if area > 1000000:
    area = area / 1000000
    print("Triangle area is", area, "square kilometres")
else:
    print("Triangle area is", area, "square metres")
```

(7 marks)

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(b) Complete the output produced by the following program when the user enters **12** at the prompt.

```
numberEntered = int(input("Please enter a number: "))
counter = 1

while counter < numberEntered:
    if numberEntered % counter == 0:
        print(" %", counter)
    else:
        print("!%", counter)
    if counter * 2 >= numberEntered:
        print("Double!")
        counter = counter * 2
    counter = counter + 1
print("counter:", counter)
```

```
Please enter a number: 12
% 1
% 2
% 3
% 4
!% 5
% 6
Double!
counter: 13
```

(5 marks)

CONTINUED

4. Spreadsheets (14 marks)

All parts of this question refer to the spreadsheet shown below. The left side of the spreadsheet shows a table of prices per kilogram for different fruit and vegetables. The right side of the spreadsheet shows a list of sales of particular food items.

	A	B	C	D	E	F	G	H	I	J	K
1											
2		Food Price Per Kg			Food Sales						
3		Apple	\$0.50		Sale	Type	Price per Kg	Weight (Kg)	Wheelbarrow	Price	Running Total
4		Banana	\$0.80		1	Apple	\$0.50	8.0	N	\$4.00	\$4.00
5		Carrot	\$0.75		2	Banana	\$0.80	10.0	N	\$8.00	\$12.00
6		Eggplant	\$3.14		3	Apple	\$0.50	4.0	N	\$2.00	\$14.00
7		Garlic	\$1.62		4	Carrot	\$0.75	16.0	Y	\$12.00	\$26.00
8		Lettuce	\$1.00		5	Lettuce	\$1.00	6.0	N	\$6.00	\$32.00
9		Onion	\$0.20		6	Onion	\$0.20	10.0	N	\$2.00	\$34.00
10		Orange	\$0.42		7	Pear	\$0.60	5.0	N	\$3.00	\$37.00
11		Pear	\$0.60		8	Lettuce	\$1.00	12.0	Y	\$12.00	\$49.00
12					9	Apple	\$0.50	14.0	Y	\$7.00	\$56.00
13					10	Onion	\$0.20	20.0	Y	\$4.00	\$60.00
14											
15										Average Price per Sale:	\$6.00

(a) In cell J15 the average price of the sales from the list directly above is shown. What is the **best** formula to use in cell J15?

= AVERAGE (J4:J13)

(2 marks)

(b) Cell I4 records whether a wheelbarrow is needed (“Y”) or not (“N”) for the sale. A wheelbarrow is needed if the weight (H4) is **over** 10 Kg. What is the **best** formula to use in cell I4? **Note:** The formula must be able to be filled down.

= IF (H4 > 10, "Y", "N")

(2 marks)

(c) Cell J4 records the total price of the sale item (Price per Kg multiplied by Weight). What is the **best** formula to use in cell J4? **Note:** The formula must be able to be filled down.

= G4 * H4

(2 marks)

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- (d) Cell G4 uses a VLOOKUP formula to look up the **Price per Kg** of the food item in cell F4.

The syntax of the **vlookup** function is given below:

```
vlookup(lookup_value, table_array, col_index_num, [range_lookup])
```

What is the **best** formula to use in cell G4?

Note: The formula **must** use the VLOOKUP function to get the appropriate unit from the table in cells B3:C11 and **must** be able to be filled down.

= VLOOKUP (F4, \$B\$3:\$C\$11, 2, FALSE)

(4 marks)

- (e) In **one** sentence, explain why you chose the value you used for **range_lookup** above.

I chose FALSE for the range_lookup because we needed an exact match - we were not looking to find what range it was in.

(1 mark)

- (f) Cell K4 displays the total price of all sales up to that point. What is the **best** formula to use in cell K4? **Note:** The formula must be able to be filled down.

= SUM (\$J\$4:J4)

(3 marks)

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5. XHTML and CSS (12 marks)

- (a) The following web page has been successfully validated as XHTML 1.0 Strict. On the following page, draw what the page will look like when it is displayed by a web browser. Indicate bold text by drawing it much **darker** than the rest of the text.

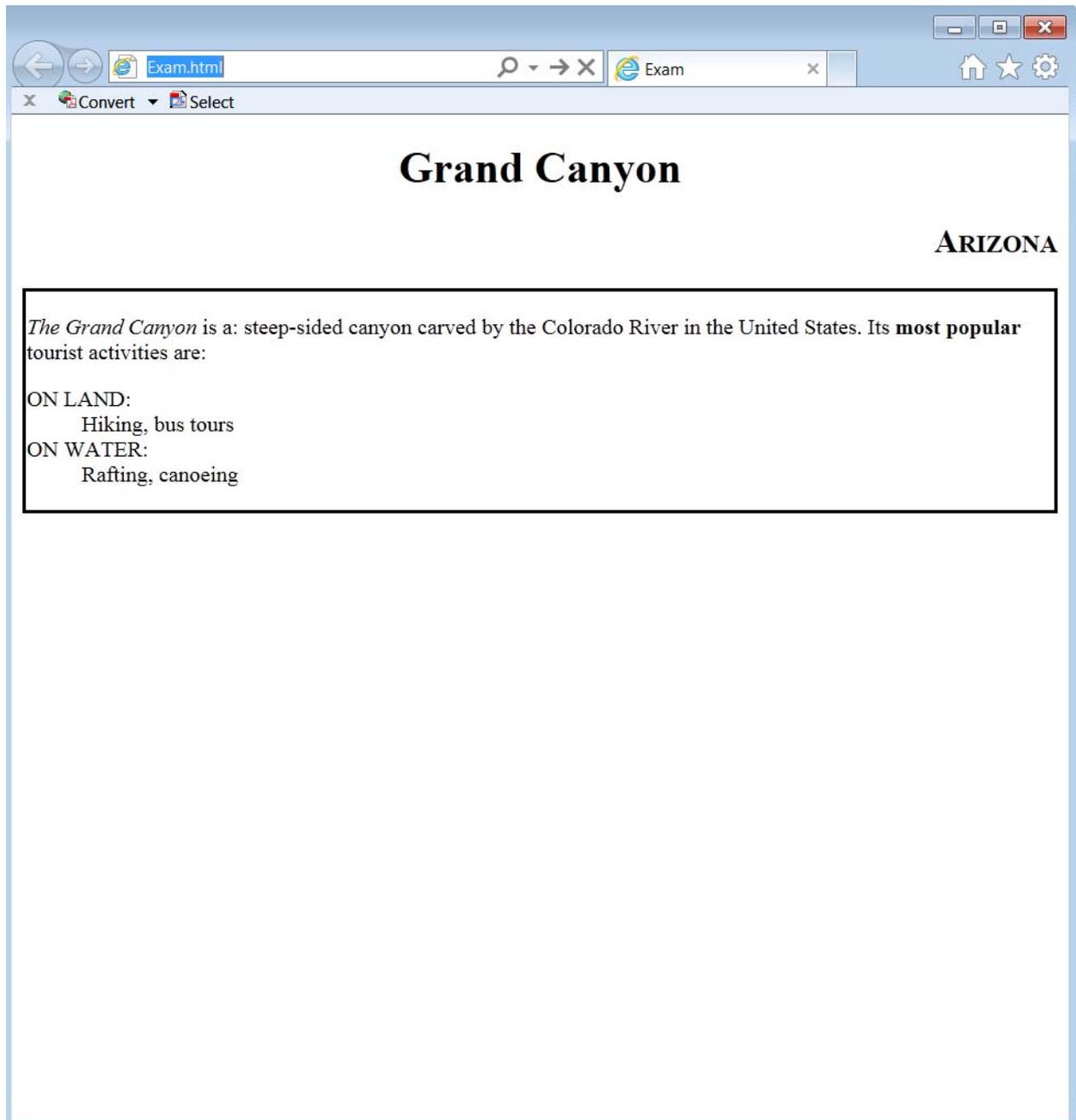
```
<?xml version="1.0" encoding="utf-8"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<html xmlns="http://www.w3.org/1999/xhtml" xml:lang="en"
lang="en">

<head>
  <title>Exam</title>
  <style type="text/css">
    #text {text-align:center;}
    #italic {font-style:italic;}
    #right{text-align:right;font-variant:small-caps;}
    .term{text-transform:uppercase;}
    .strong{font-weight:bold;}
    #group{border-style:solid;border-width:medium;}
  </style>
</head>

<body>
  <h1 id="text">Grand Canyon</h1>
  <h2 id="right">Arizona</h2>
  <div id="group">
    <p><span id="italic">The Grand Canyon</span> is a:
      steep-sided canyon
      carved by the Colorado River
      in the United States.

      Its <span class="strong">most popular </span>
      tourist activities are:
    </p>
    <dl>
      <dt class="term">On Land:</dt>
      <dd>Hiking, bus tours</dd>
      <dt class="term">On Water: </dt>
      <dd>Rafting, canoeing</dd>
    </dl>
  </div>
</body>
</html>
```

CONTINUED



The screenshot shows a web browser window with the address bar containing "Exam.html". The page title is "Exam". The main content of the page is as follows:

Grand Canyon

ARIZONA

The Grand Canyon is a steep-sided canyon carved by the Colorado River in the United States. Its **most popular** tourist activities are:

ON LAND:
Hiking, bus tours

ON WATER:
Rafting, canoeing

(7 marks)

CONTINUED

(b) List the **three** possible locations where css styles can be defined.

- (i) **Inline (i.e. inside a tag)**
- (ii) **Internal Stylesheet (i.e. in the head part of the document)**
- (iii) **External Stylesheet (i.e. in a .css file)**

(3 marks)

(c) Define an XHTML CSS style rule that makes **all** 2nd level headings centred on the page and with a background colour of red.

```
h2 { text-align:center; background-color:red; }
```

(2 marks)

6. Artificial Intelligence (AI) and Social Issues (8 marks)

(a) Describe **one** of the philosophical arguments against strong AI.

John Searle's Chinese Room: Imagine a computer that can speak fluent Chinese. Strong AI would claim that the computer is intelligent. Imagine John Searle sitting in a room full of books. He receives a set of Chinese symbols, looks them up in a book and writes down the symbols in response. John Searle does not understand Chinese but can converse in Chinese. Computers do the same thing. The internal processes do matter.

Blockhead (Ned Block): Given any conversation, there are a finite number of syntactically and grammatically correct sentences to start the conversation. For each starting sentence, a finite number of syntactically and grammatically correct responses exist. Imagine a computer that has been programmed with all of these sentences. Ned Block argues that this computer could converse with a person and would be able to pass the Turing Test even though it was not intelligent.

(3 marks)

(b) Name **two** natural language processing tasks to which AI has been applied. Would each of these applications be considered strong AI or weak AI?

Linguistics (e.g. sentence trees, grammar, etc.) - weak AI.

Voice production and recognition (e.g. telephone customer service) - weak AI.

An automated online customer service assistant providing customer service on a web page - weak AI.

(3 marks)

(c) List **two** advantages of the Internet being anonymous.

Allows discussion of sensitive issues (e.g. sexual abuse, mental illness, substance abuse).

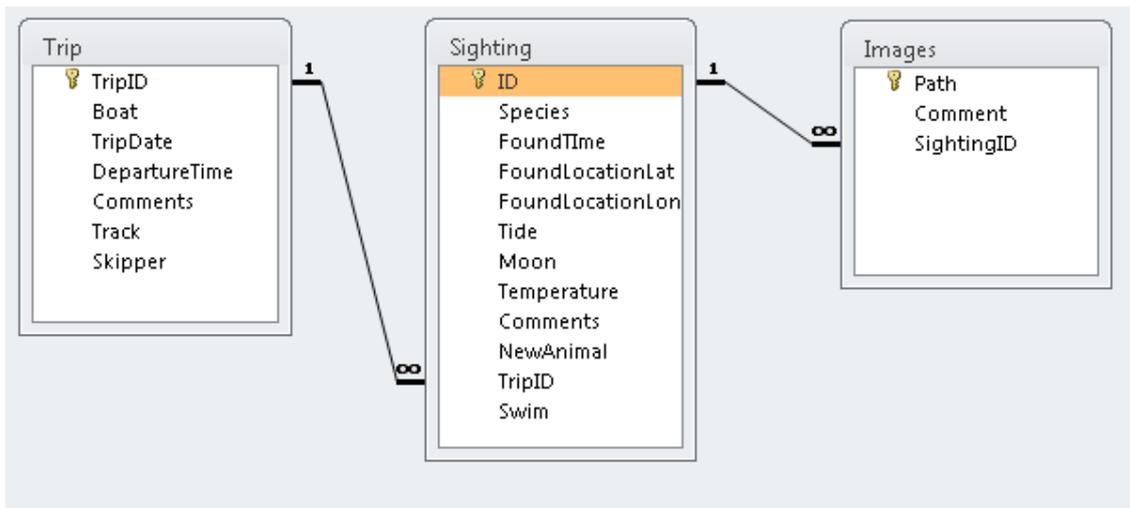
Allows people to ask questions without embarrassment

Allows people to report illegal activities without fear of retribution

(2 marks)

7. Databases (12 marks)

The following Microsoft Access relationship diagram is to be used for Parts (a) – (d) of this question.



(a) What type of relationship exists between the **Trip** table and the **Sighting** table?

One to many

(1 mark)

(b) List all of the foreign keys (if any exist) in the relationship diagram above. For each foreign key that you list, please ensure that you also state the table that the foreign key is in.

Trip ID in the Sighting Table
Sighting ID in the Images Table

(2 marks)

(c) What is the primary key of the **Images** table?

Path

(1 mark)

ID.....

- (d) Write an SQL statement which will give the dates of all of the trips which had Paul as the skipper, making sure the dates are listed in ascending order.

```
SELECT TripDate
FROM Trip
WHERE Skipper = "Paul"
ORDER BY TripDate;
```

(4 marks)

- (e) What is a primary key? How does this relate to the concept of a foreign key?

A primary key is a field or set of fields that uniquely defines a record in a table.
A foreign key is a field in a table that relates to the primary key in another table (i.e. it matches).
We can use the foreign key and primary key to join information in the two tables where there are common values.

(2 marks)

- (f) Give **two** reasons why you might use a database management system instead of a spreadsheet.

A DBMS gives us a powerful query tool to access the data. Queries can be done quickly by selecting data using particular criteria.
A DBMS has a report writer to create reports from selected data. Reports are able to be produced very quickly on the selected data and the data sorted in any order.
A DBMS allows us to avoid repetition of data across files and preserves data integrity (i.e. checks if the value is a valid value for a field).

(2 marks)

CONTINUED

8. LaTeX (12 marks)

(a) On the following page, write the LaTeX code that will produce the following output:

Geometry

Paul
2013

1 Triangle

1.1 Formulae

- A triangle's area is calculated as: $Area_{triangle} = \frac{1}{2}gh$.
- A tetrahedron is a *polyhedron* composed of 4 triangles. Volume is calculated as:

$$V = \frac{a^3}{12}\sqrt{2} \tag{1}$$

Note: The file name of the triangle diagram is **triangle.png**. The diagram is in the same folder as the LaTeX document, and is to be displayed using the default width. 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>
\emph{}	itemize	\$
\section{}	enumerate	\sum_{}^{\{}}
\subsection{}	verbatim	\frac{\{\}}{\{\}}
\large	flushright	\sqrt{\{}}
\textbf{\{}}	center	\geq
\includegraphics{\{}}	quote	\pi
\title{\{}	displaymath	\infty
\author{\{}	equation	^
\date{\{}		-
\maketitle		
\item		

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

\title{Geometry}
\author{Paul}
\date{2013}
\maketitle
\section{Triangle}
\begin{center}
  \includegraphics{triangle.png}
\end{center}
\subsection{Formulae}
\begin{itemize}
  \item A triangle's area is calculated as:  $Area_{triangle} = \frac{1}{2}gh$ .
  \item A tetrahedron is a \emph{polyhedron} composed of 4 triangles.
    Volume is calculated as:
    \begin{equation}
      V = \frac{a^3}{12}\sqrt{2}
    \end{equation}
  \end{itemize}
\end{document}
```

(8 marks)

- (b) Name **four** different classes of LaTeX documents that can be specified in a `\documentclass{}` command.

- (i) **book**
- (ii) **article**
- (iii) **report**
- (iv) **letter**

(4 marks)

ID.....

- 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.

ID.....

Rough Working – This page will not be marked

ID.....

Rough Working – This page will not be marked

