# THE UNIVERSITY OF AUCKLAND

**SECOND 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
Answer Section A (Multiple choice questions) on the Teleform answer sheet provided.
Answer Section B 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 - 25 | Multiple Choice | | 50 |
| 26 | Programming using Python | | 10 |
| 27 | Spreadsheets | | 10 |
| 28 | Databases | | 10 |
| 29 | LaTeX | | 10 |
| 30 | XHTML and CSS | | 10 |
| | TOTAL | | 100 |

# SECTION A

# MULTIPLE CHOICE QUESTIONS

Each question in this section is worth **2 marks**.  There is only **one** correct answer for each question.  For each question, choose the **best** answer according to the information presented in lectures.  Select your preferred answer on the Teleform answer sheet provided by shading in the appropriate box.

**Question 1**
[2 marks] Which decimal number is equal to the binary number 11101?

   (a) 19
   (b) 15
   (c) 23
   (d) **29**
   (e) 58

**Question 2**
[2 marks] Which of the following values is the largest?

   (a) **1 TiB**
   (b) 1000 GiB
   (c) 1000 GB
   (d) 1024 GB
   (e) 1 TB

**Question 3**
[2 marks] If a computer costing $1000 in 2013 can complete a given task in 1 minute, how long would it take a computer costing $1000 in 2022 to perform the same task?  Choose the closest answer.  Assume that computer technology improves according to Moore's Law.

   (a) Approximately 16 seconds.
   (b) Approximately 0.25 seconds.
   (c) **Approximately 1 second.**
   (d) Approximately 8 seconds.
   (e) Approximately 0.025 seconds.

**Question 4**
[2 marks] What is the main function of a motherboard?

   (a) **To connect all the major components of a computer together.**
   (b) To provide a template for efficient reproduction of other hardware.
   (c) To convert AC to DC voltage.
   (d) To store information persistently.
   (e) To follow instructions and perform calculations.

**Question 5**
[2 marks] Which one of the following statements is TRUE?

    (a) An 'open' standard means that anyone can use the standard to read data stored in a file, but it is not permissible to write data to a file without a 'close' standard.

    (b) Copyright law in NZ protects inventions that include new algorithms and ideas such as the "fluent user interface" or "ribbon" introduced with Office 2010.

    (c) **Changing a file extension will not affect the data in the file.**

    (d) Systems with single-core processors execute instructions one at a time directly from the hard drive, but machines with multi-core processors can load the instructions into RAM where they can be executed faster.

    (e) Software patents are legally enforceable in NZ and legally prevent anyone using a "portable device to access Internet-based web sites using a single click", but the patents are not enforced in practice.

**Question 6**
[2 marks] What is an operating system?

    (a) **A collection of programs that manages system resources such as memory, processing time, and storage space.**

    (b) A system that has been deployed and is currently being used, as opposed to still being developed.

    (c) Software that is specifically designed to run medical equipment such as the Therac-23.

    (d) An interface that uses graphical components such as windows, icons and pointers to control software.

    (e) A standard way to store information that is "open" and enables sharing and collaboration between systems, and adhering to ISO guidelines.

**Question 7**
[2 marks] Which one of the following has the events in the correct chronological order, from earliest to latest?

    (a) TCP/IP created, WWW created, DNS created, NSFNet created.

    (b) ARPANET created, DNS created, TCP/IP created, WWW created.

    (c) **Sputnik launched, TCP/IP created, DNS created, WWW created.**

    (d) ARPANET created, Sputnik launched, TCP/IP created, WWW created.

    (e) Sputnik launched, TCP/IP created, WWW created, DNS created.

**Question 8**

[2 marks] Which one of the following statements is FALSE?

(a) The Domain Name System is used to translate from a human readable domain name to an Internet Protocol address.
(b) **TCP is used to route data from a source to a destination computer through the Internet.**
(c) New Zealand was connected to the Internet in 1989, before the public could use the WWW.
(d) An IPv4 address consists of a set of four numbers separated by dots.
(e) There are a finite number of IP addresses available.

**Question 9**

[2 marks] Which one of the following statements is FALSE?

(a) **Recipients in the TO field of an email message can see the addresses that are in the BCC and CC fields.**
(b) Recipients in the BCC field can see the addresses that are in the TO and CC fields.
(c) Any type of file can be sent as an email attachment.
(d) Email is transferred from a client to a mail server using SMTP.
(e) Email might not be sent by the person listed in the "From" field.

**Question 10**

[2 marks] How are blog posts normally ordered?

(a) By time, from oldest to the most recent.
(b) Alphabetically by title, from A to Z.
(c) According to the number of comments, from most comments to least.
(d) **By time, from most recent to oldest.**
(e) Grouped according to subject keyword.

**Question 11**

[2 marks] Which of the following is NOT a protocol?

(a) TCP
(b) HTTP
(c) IP
(d) FTP
(e) **WWW**

**Question 12**

[2 marks] What does a Domain Name Server do?

(a) **Translates a domain name into an IP address.**
(b) Stores the web pages for a domain.
(c) Searches the WWW for available domain names to sell.
(d) Stores the names of people able to access a domain.
(e) Translates an IP address into a domain name.

**Question 13**

[2 marks] Which of the following statements is TRUE?

    (a) A peer-to-peer network only allows the sharing of illegal (pirated) files.
    (b) Using a peer-to-peer network is illegal in the United States.
    (c) **A peer-to-peer network allows the sharing of legal and illegal (pirated) files.**
    (d) A peer-to-peer network only allows the sharing of legal files.
    (e) Using a peer-to-peer network is illegal in New Zealand.

**Question 14**

[2 marks] Which of the following is NOT a method that can be used to protect children from viewing unsuitable material on the WWW?

    (a) The use of blocking software that uses a black list of blocked sites.
    (b) Only allow Internet access on a computer in a public space in the home, such as in the lounge.
    (c) The use of blocking software that uses a white list of approved sites.
    (d) **The use of anti-virus software to monitor files that are downloaded.**
    (e) The use of filtering software that looks for particular words or phrases.

**Question 15**

[2 marks] Which of the following statements about styles in MS Word is FALSE?

    (a) **A style is unique to a document and cannot be shared between documents.**
    (b) A style can be modified after a document has been saved.
    (c) You can apply many formatting changes to a style at once.
    (d) Modifying a style affects all text that uses that style.
    (e) The appearance of a style is consistent.

**Question 16**

[2 marks] Which of the following lists of computers is in chronological order of first use?

    (a) ENIAC, Colossus, Altair, IBM PC, Apple Macintosh
    (b) **Colossus, ENIAC, Altair, IBM PC, Apple Macintosh**
    (c) ENIAC, Colossus, Altair, Apple Macintosh, IBM PC
    (d) Colossus, ENIAC, Apple Macintosh, Altair, IBM PC
    (e) Altair, Colossus, ENIAC, Apple Macintosh, IBM PC

**Question 17**

[2 marks] The Graphical User Interface (GUI) was first developed by?

    (a) **Xerox**
    (b) Apple
    (c) Microsoft
    (d) IBM
    (e) Hewlett-Packard

**Question 18**

[2 marks] Which one of the following is NOT good advice for the design of PowerPoint presentations?

(a) The font size of main points should be different than sub-points to emphasize the hierarchy.
(b) Use a simple font rather than a complex font to improve the readability of text.
(c) Use a simple colour palette to avoid distracting the audience.
(d) The colour of text should have high contrast with the background colour.
(e) **Make sure you always use complete and grammatically correct sentences.**

**Question 19**

[2 marks] Which one of the following statements is FALSE?

(a) Using PowerPoint fonts above size 18 means that most people in the last row of most lecture theatres can read the slides.
(b) PowerPoint is frequently used at the University of Auckland.
(c) Using PowerPoint makes it easy to have a consistent look to your slides.
(d) **Using PowerPoint animation always helps get your main points across.**
(e) Using PowerPoint makes it easy to make a professional looking presentation.

**Question 20**

[2 marks] How much memory is required to represent an uncompressed 16-bit colour image 10 pixels wide by 40 pixels high?

(a) 16000 bits
(b) 1600 bytes
(c) **200 bytes**
(d) 200 bites
(e) 800 bytes

**Question 21**

[2 marks] Which of the following file formats would be best to represent graphics with 512 colours with the least loss of quality?

(a) jpg
(b) pdf
(c) **png**
(d) gif
(e) doc

**Question 22**

[2 marks] Which of the following is NOT a metaphor or idea that underlies research in artificial intelligence?

    (a) Memory retrieval.
    (b) **Quantum entanglement.**
    (c) Symbolic processing.
    (d) Multi-step reasoning.
    (e) Search through a maze.

**Question 23**

[2 marks] Which of the following is NOT an ability that distinguishes humans from dogs and cats, and thus is not central to AI research?

    (a) **Recognizing a familiar object.**
    (b) Generating an extended plan.
    (c) Understanding a natural language sentence.
    (d) Designing a new building
    (e) Composing a poem

**Question 24**

[2 marks] Which of the following statements about computer viruses is FALSE?

    (a) Viruses can appear in commercial software.
    (b) A virus must be executed before it can spread.
    (c) Most viruses are harmless.
    (d) Viruses can be transmitted by hardware like printers.
    (e) **Viruses can only occur in some types of files.**

**Question 25**

[2 marks] Which of the following is a form of computer malware?

    (a) **A Trojan horse.**
    (b) A relational database.
    (c) A personal blog.
    (d) An Excel spreadsheet.
    (e) A buggy program.

**THIS PAGE HAS BEEN INTENTIONALLY LEFT BLANK.**

## SECTION B

Answer all questions in this section in the space provided. If you run out of space, please use the Overflow Sheet and indicate in the allotted space that you have used the Overflow Sheet.

## 26. Programming Using Python (10 marks)

(a) Write a Python program that prompts the user for a positive integer number. The user may enter a positive, zero, or negative value. The program should print out the *sum of the squares from 1 to the input number* if the number entered by the user is positive, and it should tell the user about the input error otherwise.

The following **two examples** show the exact formatting expected for the prompts and output. Your program must produce the same output as shown below given the input shown below.

*Example 1:*
```
Please enter a positive integer: 3
The answer is 14
```
*Example 2:*
```
Please enter a positive integer: -2
You did not enter a positive integer.
```

```python
limit = int(input("Please enter a positive integer: "))

if limit < 1:
    print("you did not enter a positive integer.")
else:
    answer = 0
    number = 1
    while number <= limit:
        answer = answer + number * number
        number = number + 1
    print ("The answer is", answer)
```

(4 marks)

(b) Show the output from the following program.

```
x = 2
y = 4
z = 15
while z >= x + y:
    print(z)
    if z % 3 == 0:
        z = z - y
    else:
        z = z - x
```
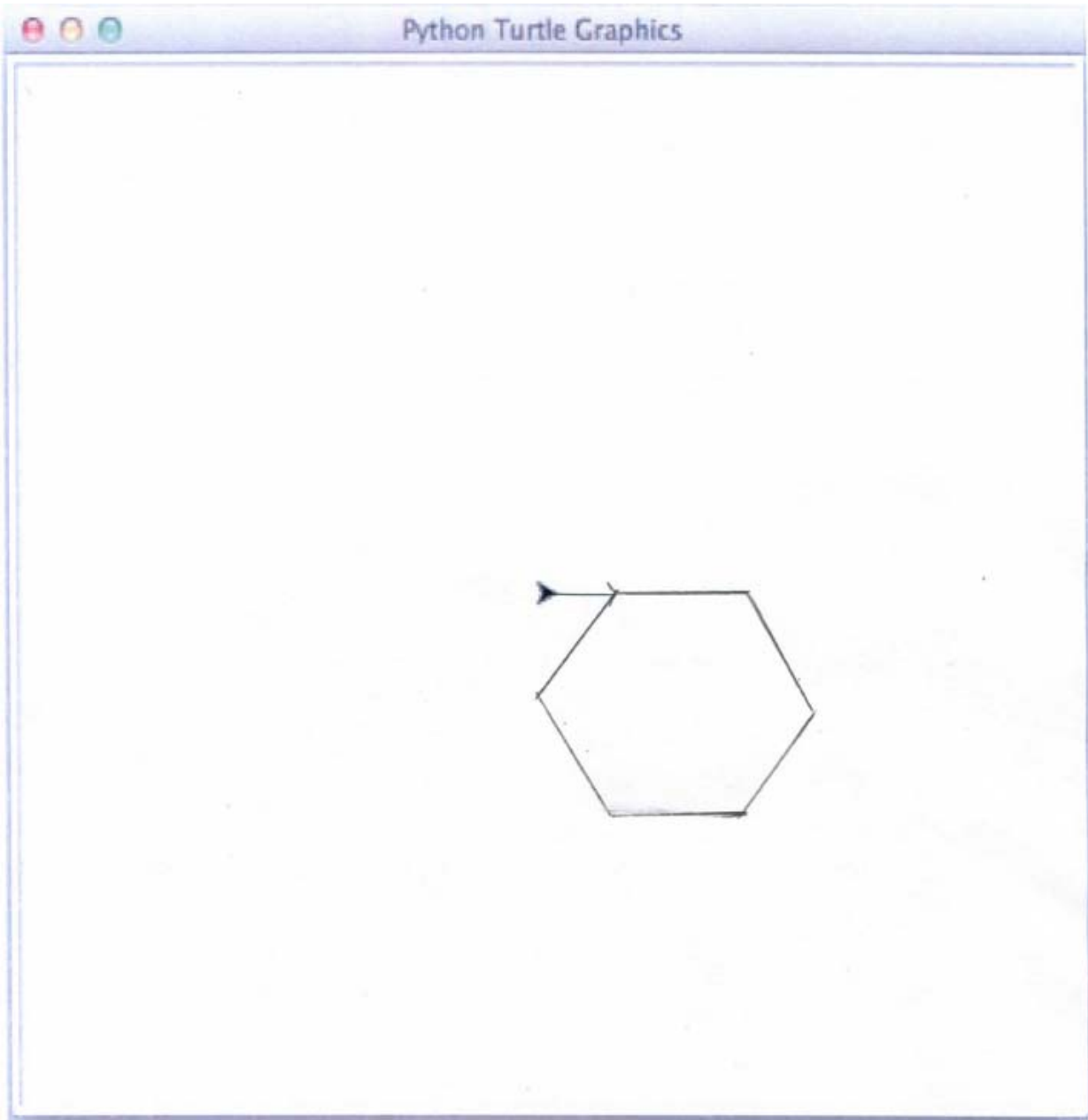
```
15
11
9
```

(3 marks)

(c) On the following page, draw the output produced by the turtle in the following Python program. Assume that the turtle begins in the middle of the window facing right and that the window is approximately 800 steps wide.

```
import turtle

sides = 6
angle = 360/sides
count = 0

turtle.forward(50)
while count < sides:
    turtle.forward(100)
    turtle.right(angle)
    count = count + 1
```

CONTINUED

(3 marks)

.

## 27. Spreadsheets (10 marks)

(a) In the following Excel spreadsheet, the values in column D are double the sums of the values in columns A, B, and C.  What is the best formula to use in cell **D1**?  Your formula must be able to be filled down to lower rows.

| | A | B | C | D |
|---|---|---|---|---|
| 1 | 4 | 3 | 7 | 28 |
| 2 | 2 | 5 | 6 | 26 |
| 3 | 5 | 9 | 1 | 30 |
| 4 | 11 | 17 | 14 | 84 |

```
= 2 * sum(A1:C1)
```

(3 marks)

(b) In the following Excel spreadsheet, the values in column D are calculated from the corresponding values in columns A and B, but the manner in which that occurs depends on the value in column C.   If C is greater than zero, then D is the sum of A and B, otherwise it is the difference of A and B.  What is the best formula to use for cell **D1**?  Your answer should use an IF function and must be able to be filled down to lower rows.

| | A | B | C | D |
|---|---|---|---|---|
| 1 | 4 | 3 | 9 | 7 |
| 2 | 7 | 5 | -6 | 2 |
| 3 | 5 | 9 | -1 | -4 |
| 4 | 16 | 17 | 2 | 33 |

```
= if ( C1 > 0 , A1 + B1 , A1 – B1 )
```

(3 marks)

CONTINUED

(c) The following Excel spreadsheet calculates the total fare for each customer who has purchased a ticket of a certain type.  The Unit Fare in Row 4 depends on the Type specified in Row 2, and is extracted from the Price Table in Cells B10:C12.  What is the best formula to use for cell **B4**?  Your answer should use the **vlookup** function, which has the syntax:

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

to retrieve the appropriate Price from the Price Table, and it should be able to be filled right to other columns.
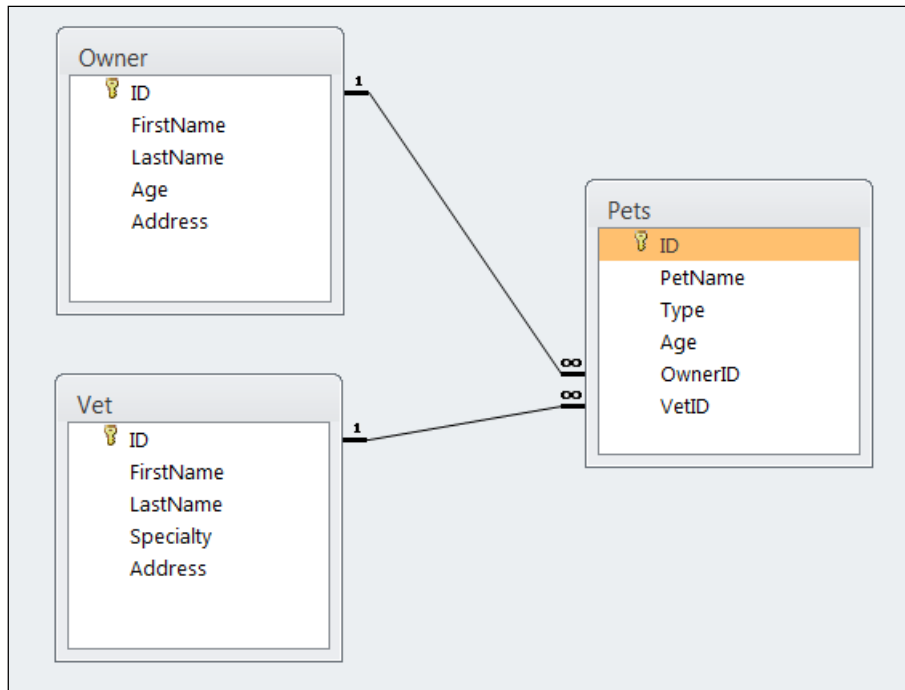
|    | A          | B      | C      | D     | E     |
|----|------------|--------|--------|-------|-------|
| 1  | Purchaser  | Abe    | Bob    | Cal   | Dan   |
| 2  | Type       | Adult  | Senior | Child | Adult |
| 3  | Number     | 2      | 1      | 2     | 3     |
| 4  | Unit Fare  | 12     | 10     | 6     | 12    |
| 5  | Total Fare | 24     | 10     | 12    | 36    |
| 6  |            |        |        |       |       |
| 7  |            |        |        |       |       |
| 8  |            |        |        |       |       |
| 9  |            | Type   | Price  |       |       |
| 10 |            | Adult  | 12     |       |       |
| 11 |            | Child  | 6      |       |       |
| 12 |            | Senior | 10     |       |       |

```
= vlookup( B2 , $B$10:$C$12 , 2 , false )
```

(4 marks)

## 28. Databases (10 marks)

Use the following Microsoft Access relationship diagram to answer the questions in this section. Note that the primary key of each table uses the AutoNumber type to ensure uniqueness.



(a) State the name of any foreign keys in the **Pets** table, along with their related table(s).

> **OwnerID    Related table: Owner**
>
> **VetId      Related table: Vet**

(2 marks)

(b) What is the appropriate **data type** for the **Age** field in the **Owner** table?

> **Number**

(1 mark)

CONTINUED

(c) Complete the query by example (QBE) form below so that it generates a query that displays the **First Name** and **Last Name** of every **Owner** who owns a **Cat** with the **Name "Spot"**.  Some example results might be:

| FirstName ▾ | LastName ▾ |
|-------------|------------|
| Anthony     | Adams      |
| Betty       | Bagshot    |
| Clarice     | Colbrook   |

| Field: | FirstName | LastName | Type  | PetName |   |
|--------|-----------|----------|-------|---------|---|
| Table: | Owner     | Owner    | Pets  | Pets    |   |
| Sort:  |           |          |       |         |   |
| Show:  | ✓         | ✓        | ☐     | ☐       | ☐ |
| Criteria: |        |          | "Cat" | "Spot"  |   |
| or:    |           |          |       |         |   |

(4 marks)

(d) Write an SQL query that displays the **Pet Name** and **Age** of every **Pet** that has both **Type "Dog"** and **Age** greater than **5**.  Some example results from the query might be:

| PetName ▾ | Age ▾ |
|-----------|-------|
| Spot      | 6     |
| Maxwell   | 6     |
| Blue      | 10    |

```
Select PetName, Age
From Pets
Where Type = "Dog" and Age > 5;
```

(3 marks)

CONTINUED

**29. LaTeX (10 marks)**

Write the LaTeX code that will produce the following output:

<center>

# Summer is Coming

### Another Student

### Sometime Soon

## 1   What Should I Do?

Some things I should think about:

- Go Tramping

- Go Biking

- Read for Fun!

### 1.1   How About Doing Some Maths?

For example, let's prove: $\sum_{i=0} z^i = \frac{1}{1-z}$

</center>

The following LaTeX 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.

| *Normal commands* | *Environments* | *Math mode commands* |
|---|---|---|
| `\emph{}`<br>`\section{}`<br>`\subsection{}`<br>`\subsubsection{}`<br>`\large`<br>`\textbf{}`<br>`\title{}`<br>`\author{}`<br>`\date{}`<br>`\maketitle`<br>`\item` | `itemize`<br>`enumerate`<br>`verbatim`<br>`flushright`<br>`center`<br>`quote`<br>`displaymath`<br>`equation`<br>`quotation` | `$`<br>`\sqrt{}`<br>`\geq`<br>`\frac{}{}`<br>`\left(`<br>`\right)`<br>`\pi`<br>`\sum_{}^{}`<br>`^`<br>`_` |

CONTINUED

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

\title{Summer is Coming}

\date{Sometime Soon}

\author{Another Student}

\maketitle


\section{What Should I Do?}

Some things I should think about:

\begin{itemize}

   \item Go Tramping

   \item Go Biking

   \item Read for Fun!

\end{itemize}


\subsection{How About Doing Some Maths?}


For example, let's prove: $  \sum_{i=0} z^{i} =

\frac{1}{1 - z}$



\end{document}
```
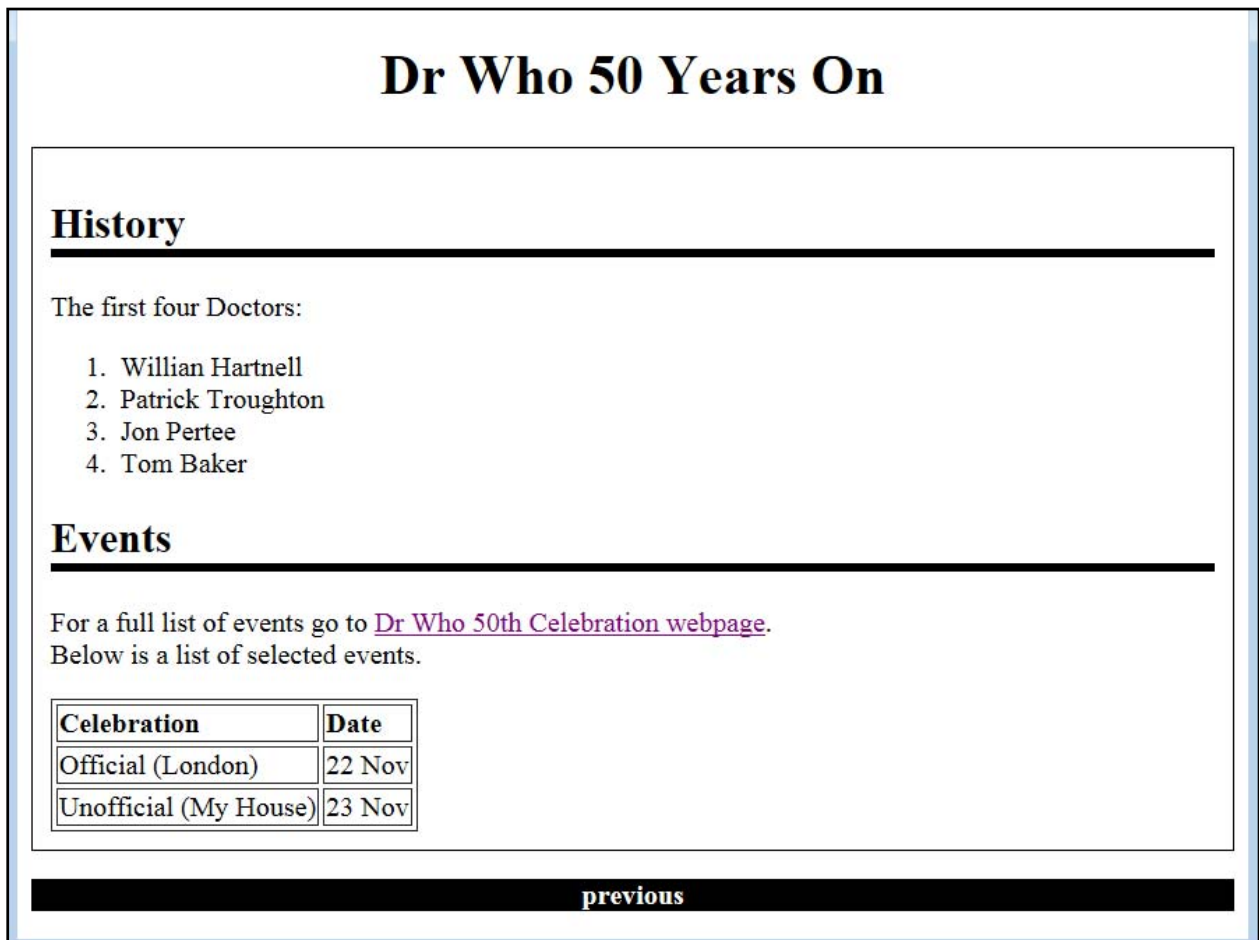
(10 marks)

## 30. XHTML and CSS (10 marks)

The following screenshot shows the body of a web page created using XHTML 1.0 strict and cascading style sheets:



Complete the XHTML code below so that it produces the output shown above.

You **must** use the styles defined in the internal style sheet in the head section below, and **must not** define any new styles.

**Note:** The url for the Dr Who 50th Celebration webpage is:
**http://celebration.doctorwho.tv**

```
<?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>50 Years of Dr Who</title>

<style type="text/css">

h1 { text-align: center; }
```

                                                        CONTINUED

```
h2 {
      border-bottom-color: black;
      border-bottom-style: solid;
      border-bottom-width: thick;
}
.history{
      border-color: black;
      border-style: solid;
      border-width: thin;
      padding: 10px;
}
.invert {
      background-color: black;
      color: white;
}
.label { font-weight: bold;}
}
#footer {
      text-align: center;
      font-weight: bold;
}
</style>
</head>

<body>

<!-- Main heading -->
```

```
<h1>Dr Who 50 Years On</h1>
```

(1 mark)

```
<!-- History -->
```

```
<div class="history">

<h2>History</h2>

<p>The first four Doctors:</p>

<ol>
  <li>Willian Hartnell</li>
  <li>Patrick Troughton</li>
  <li>Jon Pertee</li>
  <li>Tom Baker</li>
</ol>
```

(4 marks)

CONTINUED

```
<!-- Events.  Note the table has a 1px border -->
```

```html
<h2>Events</h2>


<p>
For a full list of events go to
<a href="http://celebration.doctorwho.tv"> Dr Who
50th Celebration webpage</a>.  <br/>
Below is a list of selected events.
</p>


<table border="1px">
<tr class="label">
  <td>Celebration</td>
  <td>Date</td>
</tr>
<tr>
  <td>Official (London)</td>
  <td>22 Nov</td>
</tr>
<tr>
  <td>Unofficial (My House)</td>
  <td>23 Nov</td>
</tr>
</table>


</div>
```

(4 marks)

```
<!-- Footer Information-->
```

```html
<p class="invert" id="footer">previous</p>
```

(1 mark)

```html
</body>
</html>
```

CONTINUED

**- 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.**

**- 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.**

**Rough Working – This page will not be marked**

**Rough Working – This page will not be marked**

**Rough Working – This page will not be marked**