# THE UNIVERSITY OF AUCKLAND

**SUMMER SEMESTER, 2012**
**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 | |
|---|---|
| **Forenames** | |
| **Student ID** | |
| **Login (UPI)** | |

| | Question | Mark | Out Of |
|---|---|---|---|
| 1 | Hardware and Software | | 15 |
| 2 | Internet | | 15 |
| 3 | Programming using Python | | 10 |
| 4 | Spreadsheets | | 14 |
| 5 | XHTML and CSS | | 12 |
| 6 | Databases | | 14 |
| 7 | LaTeX | | 12 |
| 8 | AI and Social Issues | | 8 |
| | TOTAL | | 100 |

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## 1. Hardware and Software (15 marks)

(a) List **three** pieces of hardware you would find inside the system unit.

(3 marks)

(b) Describe Moore's Law.

(3 marks)

(c) What decimal number does the binary number 1000 correspond to?

(2 marks)

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(d) Both *crippleware* and *nagware* are types of shareware.  Explain how each type works.

(4 marks)


(e) Explain the problem that causes most CPU's sold today to have clock speeds that don't exceed 4.0 GHz.  What has been the solution to this problem?

(3 marks)


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## 2.  Internet (15 marks)

(a)  Identify the **protocol**, **domain**, **path** and **file** requested by the following URL:

 `http://www.cs.auckland.ac.nz/courses/compsci111/lectures.html`

protocol:

domain:

path:

file:

(4 marks)

(b)  List **four** locations where logs of Internet traffic are kept.

1)

2)

3)

4)

(4 marks)

(c)  Briefly explain what a **cache** does in regard to requesting a webpage over the Internet.

(3 marks)

**CONTINUED**

(d)  State **two** advantages and **two** disadvantages of wikis.

**Advantages:**

1)


2)


**Disadvantages:**

1)


2)

(4 marks)

## 3. Programming using Python (10 marks)

(a) Write a program that calculates and displays the amount of memory required to store a bitmap image which has 4 colours.   At the beginning, the user is asked to enter the width and height of the image.

The number of bits required is calculated using the following formula  (Note that 2 bits per pixel are required to store an image with 4 colours):

$$bits\ required = width * height * 2$$

If the required number of bits is less than 8, then the amount of memory required is displayed in bits, otherwise it is displayed in bytes.   To convert the number of bits to a number of bytes, divide by 8.

**Example 1:** If the user entered **4** for the width and **3** for the height, the output that is expected from your program is shown below:

```
Enter width: 4
Enter height: 3
Memory required is 3 bytes
```

**Example 2:** If the user entered **1** for the width and **3** for the height, the output that is expected from your program is shown below:

```
Enter width: 1
Enter height: 3
Memory required is 6 bits
```

**CONTINUED**

(5 marks)

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

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

while counter > 0:
    if counter % 4 == 0:
        print(counter, " modulo 4 is zero")
    if counter % 4 == 1:
        print(counter, " modulo 4 is one")
    if counter % 4 == 2:
        print(counter, " modulo 4 is two")
    if counter % 4 == 3:
        print(counter, " modulo 4 is three")
    counter = counter - 1
print("counter: ", counter)
```

```
Please enter a number: 5
5  modulo 4 is one
4  modulo 4 is zero
3  modulo 4 is three
2  modulo 4 is two
1  modulo 4 is one
counter:  0
```

(5 marks)

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## 4. Spreadsheets (14 marks)

Questions (a) to (e) refer to the spreadsheet shown below. On the upper left side the spreadsheet shows a table of different length units with their conversion factors. The upper right side of the spreadsheet shows a list of sample conversions.

| | A | B | C | D | E | F | G | H | I | J | K |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | | | |
| 2 | | | Conversion Table | | | | | | | | |
| 3 | | | Unit A | | Unit B | | | Length | Unit | Length | Unit |
| 4 | | 1 | inch | 25.4 | mm | | | 22 | inch | 558.8 | mm |
| 5 | | 1 | mm | 0.1 | cm | | | 3 | mm | 0.3 | cm |
| 6 | | 1 | foot | 12 | inch | | | 24 | foot | 288 | inch |
| 7 | | 1 | yard | 3 | foot | | | 21 | yard | 63 | foot |
| 8 | | 1 | chain | 22 | yard | | | 6 | chain | 132 | yard |
| 9 | | 1 | mile | 5280 | foot | | | 9 | mile | 47520 | foot |
| 10 | | 1 | hand | 4 | inch | | | 5 | hand | 20 | inch |
| 11 | | | | | | | | | | | |
| 12 | | | | | | Bigger than: | 1 | 100 | 1000 | 10000 | Number of Y |
| 13 | Highest conversion factor: | | | 5280 | foot | | Y | Y | Y | N | 3 |
| 14 | | | | | | | | | | | |

(a) In cell D13 the highest conversion factor from the table directly above is shown. What is the **best** formula to use in cell D13?

(2 marks)

(b) Cell G13 records whether the conversion factor in cell D13 is greater than the number in cell G12 ("Y"), or not ("N"). What is the **best** formula to use in cell G13?
**Note:** The formula must be able to be filled right.

(3 marks)

**CONTINUED**

(c) Cell E13 uses a VLOOKUP formula to look up the **unit** of the conversion factor in cell D13.

The syntax of the **vlookup** function to search the first column of a table, and then return a value from any cell on the same row of the table is given below:

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

What is the **best** formula to use in cell E13? The formula **must** use the VLOOKUP function to get the appropriate unit from the table in cells D4:E10

(3 marks)

(d) What is the **best** formula to use in cell J4? **Note:** The formula must be able to be filled down.

(3 marks)

(e) K13 displays the total number of cells in the range G13:J13 that contain "Y". What is the **best** formula to use in cell K13?

(3 marks)

**CONTINUED**

## 5. XHTML and CSS (12 marks)

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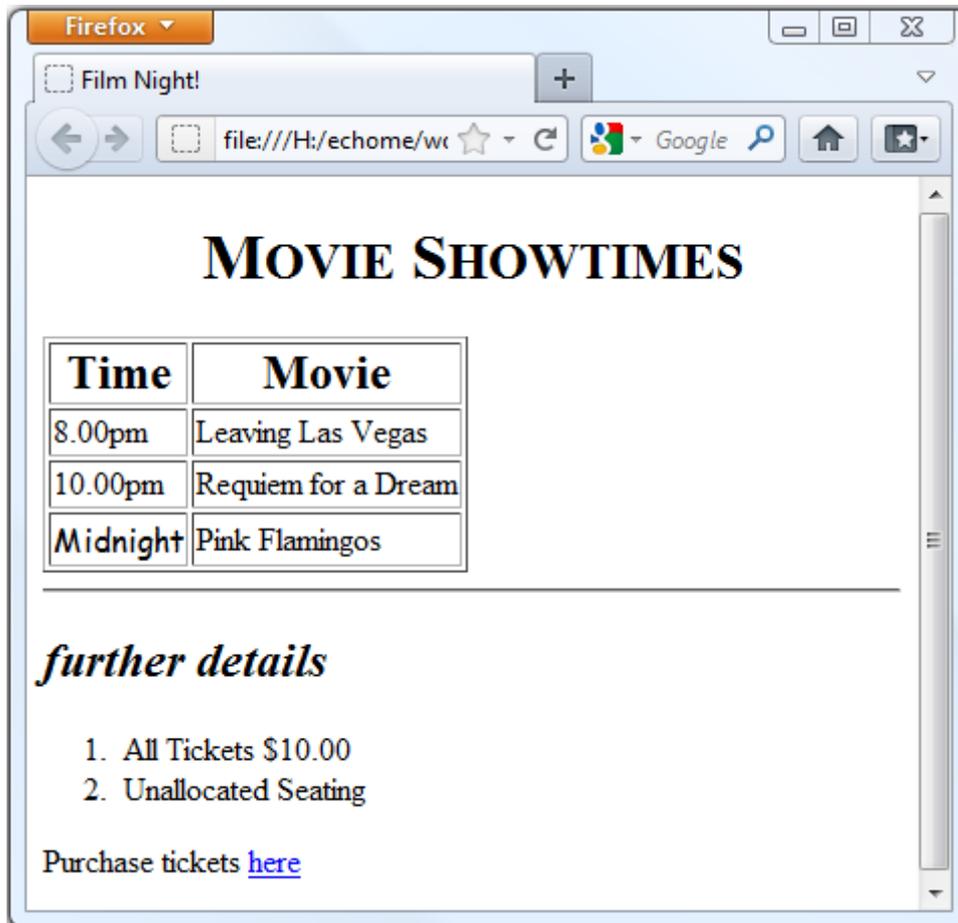


Complete the XHTML code below so that it produces the output shown above. You **must** use the styles defined in the internal style sheet in the head section below, and **must not** define any new styles.

```
<?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">

  <head>

    <title>Film Night!</title>
    <style type="text/css">
```

**CONTINUED**

```
     h1
     {
       text-align: center;
       font-family: serif;
       font-variant: small-caps;
     }
     h2
     {
       font-style: italic;
       text-transform: lowercase;
     }
     .toprow
     {
       text-align: center;
       font-weight: bold;
       font-size: x-large;
     }
     #midnight
     {
       font-family: "Comic Sans MS", cursive;
     }
   </style>
</head>
<body>
```

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

(1 mark)

```
<table border="1px">
```

```
<!-- Large and centred table header text -->
```

(2 marks)

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```
<!-- Remaining table detail rows -->
```

(3 marks)

```
</table>
```

```
<!-- Horizontal ruled line -->
```

(1 mark)

```
<!-- Lowercase subheading -->
```

(1 mark)

**CONTINUED**

```
<!-- Ordered list -->
```

(2 marks)

```
<!-- Final paragraph -->
<!-- hyperlink should proceed to "http://www.checkout.co.nz" -->
```

(2 marks)

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

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# 6.  Databases (14 marks)

(a) What is the difference between a one-to-one relationship and a one-to-many relationship?

(4 marks)

The following Microsoft Access relationship diagram is used in questions (b), (c) and (d):
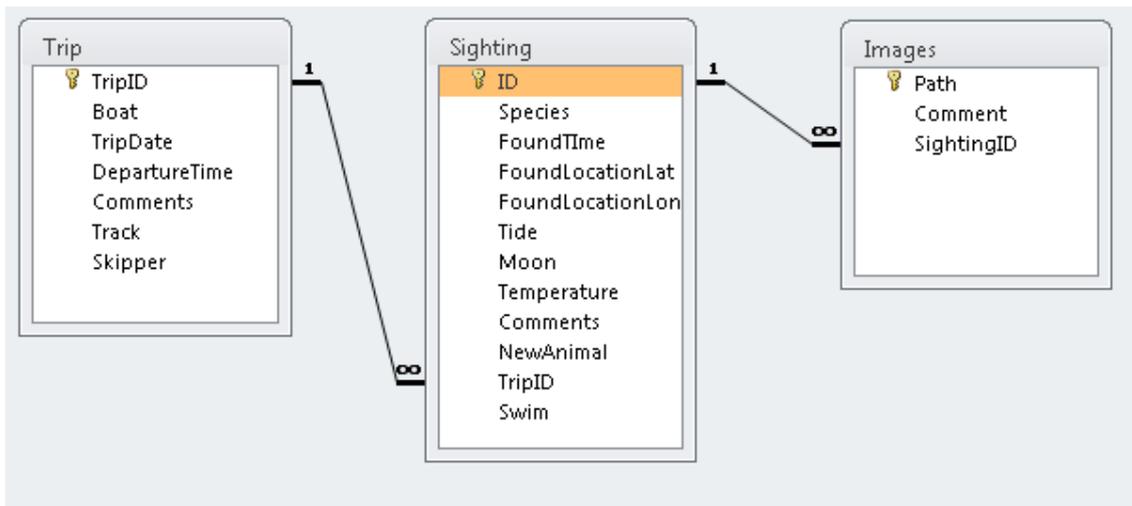


(b) State the primary key(s) of the **Images** table above.

(1 mark)

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(c) State the foreign key(s) (if any) of the **Sighting** table above.

(2 marks)

(d) What would be an appropriate data type for the **Comments** field of the **Trip** table?

(1 mark)

The following Query By Example (QBE) diagram is used in questions (e) and (f):

| Field: | Species | FoundTIme | Temperature |
|---|---|---|---|
| Table: | Sighting | Sighting | Sighting |
| Sort: | | | |
| Show: | ✓ | ✓ | ☐ |
| Criteria: | | | >50 |
| or: | | | |

(e) Explain what the above Query By Example (QBE) does.

(3 marks)

(f) Write the SQL statement that would give the same output as the above QBE.

(3 marks)

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## 7. LaTeX (12 marks)

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

> # 1    111 Exam
>
> ## 1.1    Latex
>
> Latex has different document classes:
>
> - Book
> - Report
> - Article
> - Letter
>
> To annotate a document the % sign has to be used in front of each line. What latex really excels in are formula as the following example shows:
>
> $$c = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2} \tag{1}$$

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.

| Normal commands | Environments | Math mode commands |
|---|---|---|
| \emph{} | itemize | $ |
| \section{} | enumerate | \sum_{}^{} |
| \subsection{} | verbatim | \frac{}{} |
| \large | flushright | \sqrt{} |
| \textbf{} | center | \geq |
| \title{} | quote | \pi |
| \author{} | displaymath | \infty |
| \date{} | equation | ^ |
| \maketitle | emph | |
| \item | | _ |
| \% | | |

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




\end{document}
```

(8marks)

**CONTINUED**

(b) Draw the output that would be generated by the following LaTeX code.  If quote marks appear, make it clear what type will appear.

```
\documentclass[a4paper]{article}
\begin{document}
\title{A Short Story}
\author{Mister X}
\maketitle

\section{Chapter 1}
\subsection{Tim and the Dragon}
\emph{On} the possibly last day of his life, Tim got up at 10
a.m. after a night out with his friends.
\begin{quote}
``What a wonderful day,'' he said.
\end{quote}
\begin{flushright}
He went to the kitchen where his grandma was waiting at the
prepared table.
\end{flushright}
\end{document}
```

(4 marks)

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## 8. Artificial Intelligence and Social Issues (8 marks)

(a) Name **three** other disciplines from which AI inherited ideas.

(3 marks)

(b) Name **one** type of task to which AI can be applied, and briefly explain how it can be applied.

(3 marks)

(c) Name **two** methods that parents can use to protect their children from Internet dangers.

(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.**

**CONTINUED**

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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.**

**CONTINUED**

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

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