

THE UNIVERSITY OF AUCKLAND

SECOND SEMESTER, 2016

Campus: City

COMPUTER SCIENCE

An Introduction to Practical Computing

(Time Allowed: TWO hours)

NOTE:

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

Calculators are NOT 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	<i>Model</i>
Forename(s)	<i>Answers</i>
Student ID	
Login (UPI)	

	Question	Mark	Out Of
1 - 30	Multiple Choice		30
31	Programming using Python		15
32	Spreadsheets		10
33	Databases		10
34	HTML5 and CSS		20
35	LaTeX		15
	TOTAL		100

SECTION A**MULTIPLE CHOICE QUESTIONS**

Each question in this section is worth **1 mark**. 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

[1 mark] Which one of the following statements is TRUE?

- (a) Microsoft purchased QDOS from another company and renamed it MS-DOS.
- (b) The Apple Macintosh had to be assembled after it was purchased.
- (c) The production of IBM clones helped IBM to dominate the PC market.
- (d) Microsoft was formed after Bill Gates and Paul Allen produced the Altair computer.
- (e) Microsoft only licensed MS-DOS to IBM.

Question 2

[1 mark] Which one of the following combinations were advantages of the Analytical Engine?

- I Accuracy.
- II Low power consumption.
- III Large memory capacity.
- IV Speed.

- (a) I and II
- (b) III and IV
- (c) II and IV
- (d) I and III
- (e) I and IV

Question 3

[1 mark] Which of the following forms of technology is NOT used for computer cooling?

- (a) Cooling fans.
- (b) Liquid nitrogen cooling system.
- (c) Oxygen ionizing cooling system.
- (d) Water cooling system.
- (e) Heat sink.

Question 4

[1 mark] This component is synonymous with main memory. It is much faster to read from and write to this component than other kinds of storage in a computer. When the computer's power supply is turned off, it loses its data. Which computer component are the above statements referring to?

- (a) CPU
- (b) RAID
- (c) HDD
- (d) RAM**
- (e) SSD

Question 5

[1 mark] What is the next binary number in the following sequence? 1000, 1001, 1010, ...

- (a) 1011**
- (b) 1100
- (c) 1111
- (d) 0001
- (e) 0100

Question 6

[1 mark] Which of the following statements is FALSE?

- (a) 1 MB < 1 GiB.
- (b) 1 MB < 1 GB.
- (c) 1 GB < 1 TiB.
- (d) 1 GiB < 1 GB.**
- (e) 1 GB < 1 TB.

Question 7

[1 mark] Which of the following statements about software is FALSE?

- (a) Shareware is a type of proprietary software.
- (b) Some proprietary software is available free of charge.
- (c) Computer software is a creative work that is covered by copyright law.
- (d) Some proprietary software is available at a reduced price for non-profit use.
- (e) Any software that can be downloaded free of charge may be legally copied and distributed to others.**

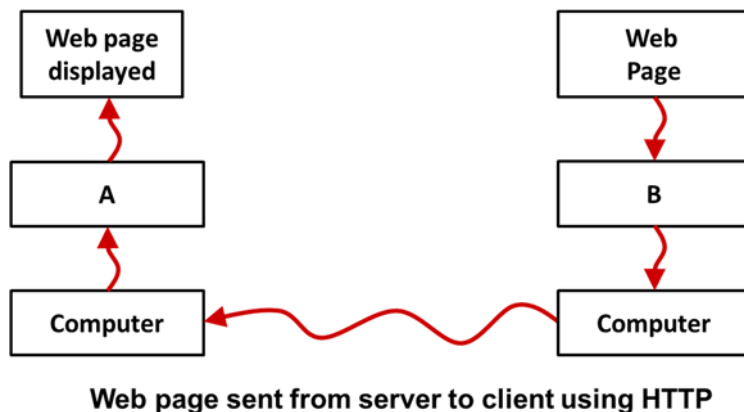
Question 8

[1 mark] Software that you can download for free, but may have to pay to continue to use after a trial period is called:

- (a) Adware.
- (b) Freeware.
- (c) Malware.
- (d) Shareware.**
- (e) Open-source software.

Question 9

[1 mark] What are A and B in the diagram below?



- (a) Protocol and web site.
- (b) Browser and web server.**
- (c) Browser and DNS.
- (d) DNS and HTTP.
- (e) Proxy and HTTP.

Question 10

[1 mark] Which of the following is NOT an example of a search engine?

- (a) Microsoft Bing.
- (b) Baidu.
- (c) DuckDuckGo.
- (d) Mozilla Firefox.**
- (e) Google.

Question 11

[1 mark] What is blocking software?

- (a) Software that tracks unsecured network connections.
- (b) Software that stops IP spoofing.
- (c) Software that stops access to websites based on the IP address using a blacklist or whitelist.
- (d) Software that stops access to the Internet based on network load.
- (e) Software that stops unauthorized access to or from a private network.

Question 12

[1 mark] Which of the following statements is FALSE?

- (a) BitTorrent allows swarming downloads.
- (b) BitTorrent is a protocol for secure communication over computer networks and provides anonymity.
- (c) BitTorrent has been used to share files illegally through sites such as The Pirate Bay.
- (d) The BitTorrent protocol was created by Bram Cohen.
- (e) BitTorrent is a communications protocol of peer-to-peer file sharing.

Question 13

[1 mark] Which of the following statements about styles in Microsoft Word is FALSE?

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

Question 14

[1 mark] What is the ASCII code for the letter 'E'?

- (a) 66
- (b) 103
- (c) 69
- (d) 101
- (e) 65

Question 15

[1 mark] Which of the following statements best describes strong AI?

- (a) The view that computers could become self-aware and exhibit intelligent behaviour.
- (b) The view that computers could appear to be self-aware and reason.
- (c) The view that computers must be developed to incorporate a behaviourist approach.
- (d) The view that computers must appear to be able to pass the Turing test.
- (e) The view that computers are non-sentient and focused on one narrow task.

Question 16

[1 mark] Which of the following statements best describes the Turing test?

- (a) Without understanding, a machine's activity cannot be described as intelligent.
- (b) Matching symbols is all that is required for a machine to be intelligent.
- (c) A machine must be able to perform symbolic representations of problems.
- (d) A machine's ability to conduct a conversation via auditory or textual methods.
- (e) The machine's ability to exhibit intelligent behaviour that is equivalent and indistinguishable from that of a human.

Question 17

[1 mark] How much memory, in bytes, is required to store an image that is 12 pixels high and 20 pixels wide? Each pixel can be displayed in one of 64 colours.

- (a) 180
- (b) 150
- (c) 1560
- (d) 1440
- (e) 1200

Question 18

[1 mark] Which of the following statements are TRUE?

- I Compressing photographs using the PNG format results in a loss of image quality.
- II Compressing photographs using the JPEG format results in a loss of image quality.
- III Compressing graphics using the JPEG format results in a loss of image quality.
- IV Compressing graphics using the GIF format results in a loss of image quality.
- V The PNG format supports more colours than the GIF format.

- (a) I and II
- (b) I, IV and V
- (c) II, III and V
- (d) II and III
- (e) I, II and V

Question 19

[1 mark] Which of the following are output devices?

- I High-definition TV.
- II Surround sound speaker setup.
- III Mouse.
- IV Controller.

- (a) I, II, and IV
- (b) I, II and III
- (c) III and IV
- (d) I and II
- (e) All of them.

Question 20

[1 mark] Which of the following game genres is NOT combat oriented?

- (a) First person shooters.
- (b) Real time strategy games.
- (c) Platform games.
- (d) Fighting games.
- (e) None of the above.

Question 21

[1 mark] Which of the following statements is TRUE?

- (a) Free-to-play games make their core content available for free, but let users engage in microtransactions.
- (b) With “packaged” games you pay for the game upfront for full access to its features.
- (c) Microtransactions involve purchasing in-game content using real world money.
- (d) Downloadable content is additional content made available for a game post-release.
- (e) All of the above.

Question 22

[1 mark] Which of the following are artifact elements?

- I Game mechanics.
- II Dynamics.
- III Emergent narratives.
- IV Embedded narratives.

- (a) I, III and IV
- (b) I and IV
- (c) I and III
- (d) I, II and IV
- (e) All of the above.

Question 23

[1 mark] The Microsoft Kinect is a special camera, an input device, used for tracking player movement. Unfortunately the camera is not accurate enough to map player movement to in-game controls. Using the Kinect as an input device is an example of bad game design involving the misalignment of which of the following game elements?

- (a) Aesthetics and game mechanics.
- (b) Game mechanics and dynamics.
- (c) Game mechanics and technology.
- (d) Technology and dynamics.
- (e) Aesthetics and dynamics.

Question 24

[1 mark] Which of the following statements would be **good** web design advice?

- (a) Use a word processor to prepare the text content for your web page to avoid typos and grammatical errors.
- (b) When choosing colours for your website, always pick bright ones.
- (c) The more clicks it takes to navigate a website the better.
- (d) Make your web page exciting by using a novel layout/design users have not seen before.
- (e) Complicated fonts can be used to emphasize important content.

Question 25

[1 mark] Which of the following lists of events is in chronological order (from earliest to most recent)?

- (a) World War II, ARPA founded, clear speech transmitted bi-directionally, the Cold War ended.
- (b) World War II, clear speech transmitted bi-directionally, ARPA founded, the Cold War ended.
- (c) Clear speech transmitted bi-directionally, World War II, ARPA founded, the Cold War ended.
- (d) The Cold War ended, clear speech transmitted bi-directionally, World War II, ARPA founded.
- (e) ARPA founded, clear speech transmitted bi-directionally, World War II, the Cold War ended.

Question 26

[1 mark] Which of the following are valid IP addresses?

- I 192.245.265.0
- II 0001:5a1d:feed:face:f00d:070d:1e00:2387
- III 233.197.35.6
- IV 00g6:4390:f155:1111:0007:8899:e2399:a45b
- V 255.255.255.0

- (a) I and IV
- (b) II and III
- (c) I, III and V
- (d) II, III and V
- (e) All of them are valid IP addresses.

Question 27

[1 mark] Which of the following statements is TRUE?

- (a) Traditional telephone networks use packet switching.
- (b) The Internet uses circuit switching.
- (c) Packet switching networks use central exchange nodes.
- (d) Circuit switching networks are decentralized.
- (e) With a packet switching network, routing changes based on network conditions.

Question 28

[1 mark] Which of the following statements is FALSE?

- (a) Spam can be used in a sandwich.
- (b) Many email clients have spam filters that help prevent spam from appearing in your inbox.
- (c) Spam is a global issue making enforcement of spam laws difficult.
- (d) The term spam is commonly used to refer to solicited bulk emails.
- (e) Spam wastes bandwidth and storage space.

Question 29

[1 mark] Which of the following statements is TRUE?

- (a) Wikis are collaborative websites with user editable content.
- (b) “The Martian” is an example of successful direct online publishing.
- (c) Online publishing has given grassroots movements a voice that they might not otherwise have had.
- (d) Issues associated with online publishing include censorship and privacy.
- (e) All of the above.

Question 30

[1 mark] What wiki markup would you use to produce the following **internal link**?

- [Damir Azhar](#)

You can assume that the name of the page is **User:Dazh001**.

- (a) [[User:dazh001|Damir Azhar]]
- (b) *[[User:dazh001|Damir Azhar]]
- (c) #[User:dazh001 Damir Azhar]
- (d) *[User:dazh001|Damir Azhar]
- (e) [User:dazh001|Damir Azhar]

THIS PAGE HAS BEEN INTENTIONALLY LEFT BLANK.

QUESTION/ANSWER BOOKLET FOLLOWS

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.

31. Programming Using Python (15 marks)

(a) What is the output of the following program?

```
count = 1
end = 6
term = count
step = count + 1

while count < end:
    print(term)
    term = term + step
    step = step + 1
    count = count + 1
```

1
3
6
10
15

(5 marks)

(b) Using the space provided below, draw the output produced by the execution of the Python 'turtle' program listed below. Assume that the turtle begins in the middle of the window facing right and that the window is approximately 400 steps wide.

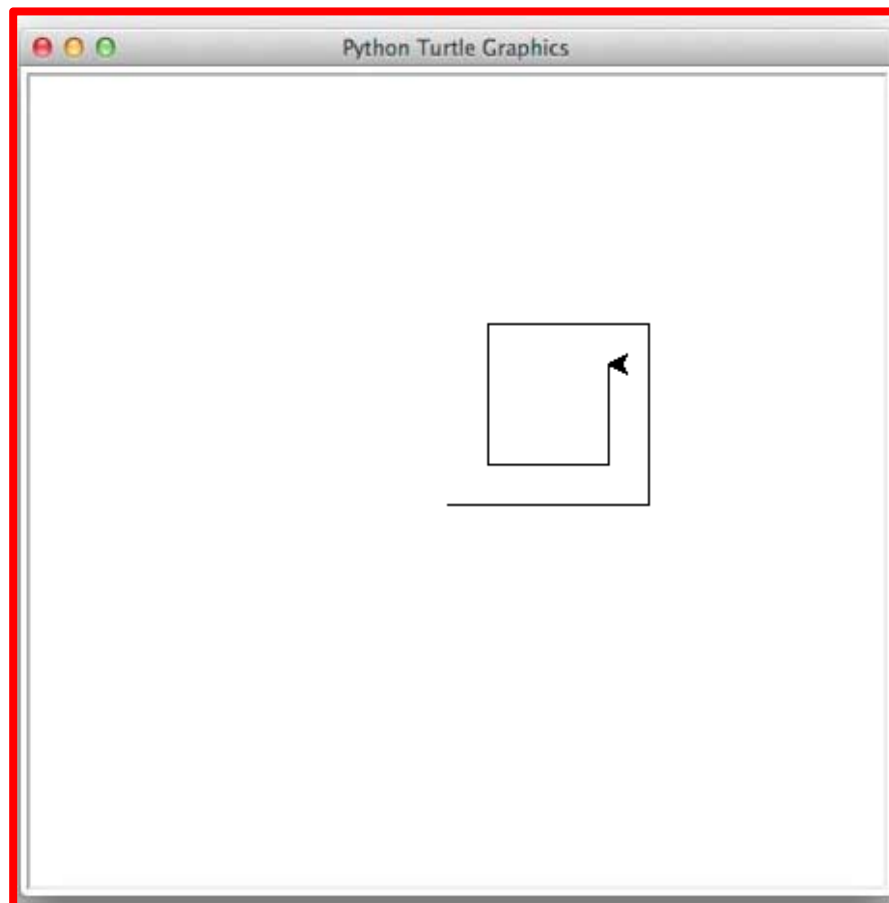
Make sure to clearly indicate:

- the path drawn by the turtle.
- the final position and direction of the turtle (using the arrowhead).

```
import turtle

steps = 100
angle = 90
decrement = -10
sides = 0
end = 6

while sides < end:
    turtle.forward(steps)
    turtle.left(angle)
    steps = steps + decrement
    sides = sides + 1
```



(5 marks)

(c) In the space below, write a Python program that calculates the total of the first N square numbers. A square number is a number we get by multiplying an integer by itself. For example the first four square numbers are: 0, 1, 4, 9.

Your program needs to prompt the user for **N**, a positive integer. You can assume that the number entered by the user is a valid integer. However if the user does not enter a value greater than 0, the program continues to prompt the user for a positive integer with the text "At least 1 square number is required. Try again: ", until the user enters a number greater than 0.

The following **example** shows the exact formatting expected for the prompts and output.

Example:

```
Number of square numbers to total: 0
At least 1 square number is required. Try again: 4
The total of the first 4 square numbers is 14
```

```
n = int(input("Number of square numbers to total: "))
while n < 1:
    n = int(input("At least 1 square number is required.
                  Try again: "))
count = 0
total = 0
while count < n:
    square = count ** 2
    count = count + 1
    total = total + square
print("The total of the first", n, "square numbers is",
      total)
```

(5 marks)

32. Spreadsheets (10 marks)

The Professional Gaming Tour lets gamers take part in three tournaments competing for prize money. The following spreadsheet displays information about the gamers participating in the tour, their tournament ranking, and the prize money they have earned.

	A	B	C	D	E	F	G
1	The Professional Gaming Tour						
2							
3	Gamers	Tournament 1	Tournament 2	Tournament 3	Average	Total Prize	Bonus
4		Rank	Rank	Rank	Rank	Money	
5	Jon	1	3	1	1.66667	\$1,300	\$130
6	Jane	2	4	5	3.66667	\$700	None
7	Tom	3	2	3	2.66667	\$1,000	\$100
8	Mark	5	5	4	4.66667	\$400	None
9	Kate	4	1	2	2.33333	\$1,100	\$110
10							
11	Rank	Prize Money					
12	1	\$500					
13	2	\$400					
14	3	\$300					
15	4	\$200					
16	5	\$100					

- (a) Cell **E5** calculates a gamer’s average ranking over the 3 tournaments. What is the best formula to use in Cell **E5**? Your formula must be able to be filled down from **E5** to **E9** correctly.

= AVERAGE(B5:D5)

(1 mark)

- (b) Cell **F5** contains the total prize money a gamer has earned from their participation in the three tournaments. Each tournament offers participants prize money varying from \$100 to \$500 based on rank. This is summarized in the table in cells **A12:B16**. What is the best formula to use in Cell **F5**? Your answer must use the **VLOOKUP** function to retrieve the prize money won for participating in a tournament. The **VLOOKUP** function has the following syntax:

`VLOOKUP(lookup_value, table_array, col_index_num, range_lookup)`

Note: Your formula must be able to be filled down from **F5** to **F9** correctly.

```
= VLOOKUP ( B5 , $A$12:$B$16 , 2 , FALSE )  
  
+ VLOOKUP ( C5 , $A$12:$B$16 , 2 , FALSE )  
  
+ VLOOKUP ( D5 , $A$12:$B$16 , 2 , FALSE )
```

(6 marks)

- (c) Cell **G5** displays the amount of bonus money a gamer receives. A gamer only receives a bonus if their average tournament ranking is less than 3. The bonus they receive is calculated as 10% of their total prize money. If their average rank is not less than 3, then they do not get a bonus. This is indicated by the text "None". What is the best formula to use in Cell **G5**? Your answer must use an **IF** function.

Note: Your formula must be able to be filled down from **G5** to **G9** correctly.

```
= IF ( E5 < 3 , 0.1 * F5 , "None" )
```

(3 marks)

33. Databases (10 marks)

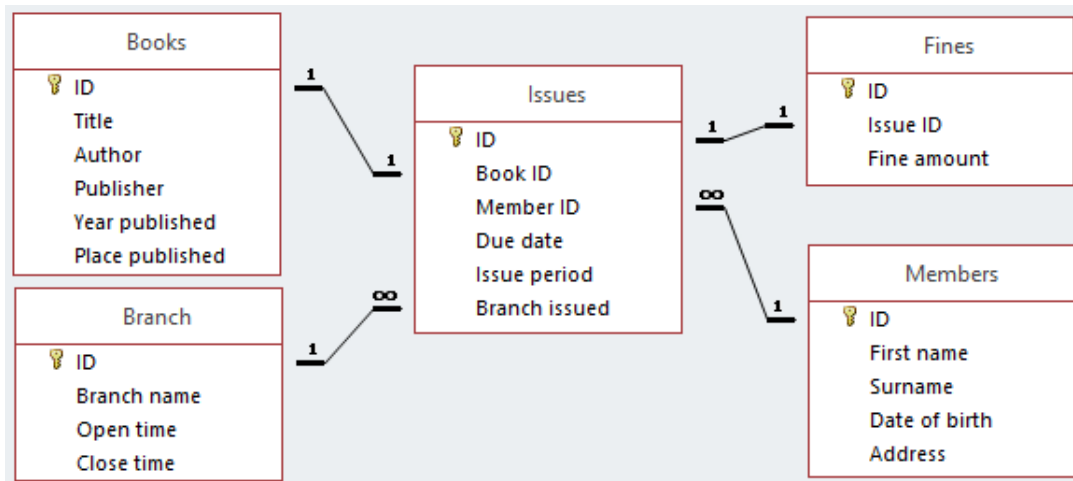
A local council has asked you to design a new database for the city's public libraries that will keep track of books as they are issued and returned.

- (a) The council knows they will need a DBMS. Briefly describe what a DBMS is and give an example of a popular DBMS.

DBMS stands for database management system. It is a piece of a software that is used to manage various aspects of a database (definition of tables, updating data, querying the database, database administration). A popular DBMS is Microsoft Access (or SQL Server, MySQL).

(1 mark)

After some time, you present the following database design to the council.



- (b) Explain how the design of this database prevents a book from being issued to two different library members. Note that books with the same title are given separate Book IDs.

There is a one-to-one relationship between Books.ID and Issues.[Book ID].

This means that a book's ID can only appear once in the Issues table, thereby preventing two different library members from issuing the same book.

(2 marks)

- (c) Write an SQL query that displays the **Title**, **Author** and **Year published** of all books published in **Auckland**. The query's results should be sorted using the **Author's name** in ascending alphabetical order (i.e. A – Z). An example of the results obtained by running the query is shown below.

Title	Author	Year published
Boy Of New Worlds	Darnell Franklin	2001
Doctors In The Beginning Of Time	Joe Morton	2005
The Mortal Fissure	Tara Smith	2015

```
SELECT Title, Author, [Year published]
FROM Books
WHERE [Place published] = "Auckland"
ORDER BY Author ASC;
```

(3 marks)

- (d) Complete the Query By Example (QBE) form below so that it generates a query that displays the **First Name** and **Last Name** of all members that have been issued books with an **Issue Period** of **15 days or more**. The **Title** and **Due Date** of the book should also be displayed. The results should be sorted using the **Due Date** in descending order. An example of the results obtained by running the query is shown below.

First name	Surname	Title	Due date
Jo	Bowen	Rebel Of The Moon	05-Oct-16
Norma	Padilla	Boy Of New Worlds	18-Sep-16
Terrence	Austin	Doctors In The Beginning Of Time	08-Sep-16
Jo	Bowen	Invaders Of The Ocean	01-Aug-16

Field:	First name	Surname	Title	Due date	Issue period
Table:	Members	Members	Books	Issues	Issues
Sort:				Descending	
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Criteria:					>=15
or:					

(4 marks)

34. HTML5 and CSS (20 marks)

The following screenshot shows the body of a web page created using HTML5 and CSS:

THE HORROR FILM FESTIVAL 2016

Welcome to the premier of the **FIRST** New Zealand film festival dedicated to horror movies!

MOVIES SHOWING

HAUTE TENSION
Directed by **ALEXANDRE AJA**

THE INNKEEPERS
Directed by **TI WEST**

DON'T BREATHE
Directed by **FEDE ALVAREZ**

BLAIR WITCH
Directed by **ADAM WINGARD**

TICKET PRICES

Categories	Prices
Student	\$11
Adult	\$15
Senior	\$10

For more information visit our [website!](http://www.thehorrorfilmfest.co.nz)

Complete the HTML5 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 film festival website is:
"http://www.thehorrorfilmfest.co.nz".

```
<!DOCTYPE html>
<html lang="en">

<head>
<meta charset="UTF-8">
<title>HTML/CSS Exam Question</title>
```

```
<style type="text/css">
body{text-align: justify; font-family: sans-serif;}
h1,h2{font-family: "Comic Sans MS", cursive; color: #8B0000;
font-variant: small-caps;}
table,tr,td{border: 2px solid #8B0000}
#first{text-transform: uppercase; font-weight: bold;
font-size: large;}
.movie-info{font-style: italic; font-variant: small-caps;
font-weight: bold; font-size: x-large;}
#thead{font-weight: bold; font-size: large;}
.price{text-align: center;}
</style>
</head>
```

```
<body>
<!-- Main Heading -->
```

```
<h1>The Horror Film Festival 2016</h1>
```

(1 mark)

```
<!-- Introductory Paragraph -->
```

```
<p>
Welcome to the premier of the
<span id="first">first</span> New Zealand film
festival dedicated to horror movies!
</p>
```

(3 marks)

```
<!-- Movies Showing Section-->
```

```
<section>
<h2>Movies Showing</h2>
<dl>
<dt class="movie-info">Haute Tension</dt>
<dd>Directed by <span class="movie-info">Alexandre
Aja</span></dd>
<dt class="movie-info">The Innkeepers</dt>
<dd>Directed by <span class="movie-info">Ti
West</span></dd>
```

```
<dt class="movie-info">Don't Breathe</dt>
<dd>Directed by <span class="movie-info">Fede
Alvarez</span></dd>

<dt class="movie-info">Blair Witch</dt>
<dd>Directed by <span class="movie-info">Adam
Wingard</span></dd>

</dl>

</section>
```

(7 marks)

<!-- Ticket Prices Section-->

```
<section>

<h2>Ticket Prices</h2>

<table>

<tr id="tablehead">
  <td>Categories</td>
  <td>Prices</td>
</tr>

<tr>
  <td>Student</td>
  <td class="price">$11</td>
</tr>

<tr>
  <td>Adult</td>
  <td class="price">$15</td>
</tr>

<tr>
  <td>Senior</td>
  <td class="price">$10</td>
</tr>

</table>

</section>
```

(7 marks)

<!-- More information paragraph -->

```
<p>  
For more information visit our  
<a href="http://www.thehorrorfilmfest.co.nz">website</a>!  
</p>
```

(2 marks)

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

35. LaTeX (15 marks)

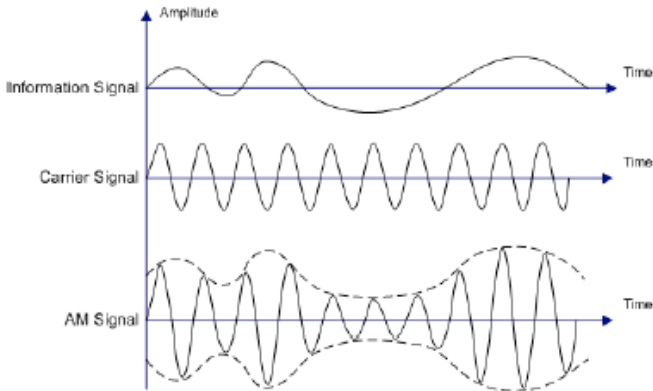
On the following pages, complete the LaTeX code that will produce the output below:

Amplitude Modulation

Wikipedia
S2, 2016

1 Introduction

With *amplitude modulation* (AM), the amplitude of a wave carrying information is varied in proportion to the information signal being transmitted.



AM is used today by several forms of communication:

- Two way radios
- VHF aircraft radios
- Computer modems

2 Mathematical Characterisation of AM

The amplitude modulated signal $y(t)$ can be represented mathematically as:

$$y(t) = [1 + M \cdot \cos(2\pi f_m t + \phi)] \cdot A \cdot \sin(2\pi f_c t)$$

The image is stored in a file called **AMpicture.png** and is in the same folder as the LaTeX code. When inserted into the document, the image should be **centred** and **7 cm wide**.

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.

<i>Normal commands</i>	<i>Environments</i>	<i>Math mode commands</i>
<code>\emph{}</code>	<code>itemize</code>	<code>\$</code>
<code>\section{}</code>	<code>enumerate</code>	<code>\sqrt{}</code>
<code>\subsection{}</code>	<code>verbatim</code>	<code>\frac{ }{ }</code>
<code>\includegraphics{}</code>	<code>flushright</code>	<code>\cdot</code>
<code>\textbf{}</code>	<code>center</code>	<code>\pi</code>
<code>\title{}</code>	<code>quote</code>	<code>\phi</code>
<code>\author{}</code>	<code>displaymath</code>	<code>\cos</code>
<code>\date{}</code>	<code>equation</code>	<code>\sin</code>
<code>\maketitle</code>	<code>quotation</code>	<code>\sum_{ }^{ }</code>
<code>\item</code>		<code>^</code>
<code>\usepackage{graphicx}</code>		<code>-</code>

```
\documentclass[a4paper]{article}
\usepackage{graphicx}
\begin{document}
\title{Amplitude Modulation}
\author{Wikipedia}
\date{S2, 2016}
\maketitle

\section{Introduction}

With \emph{amplitude modulation} (AM), the
amplitude of a wave carrying information is
varied in proportion to the information signal
being transmitted.

\begin{center}
\includegraphics[width=7cm]{AMPicture.png}
\end{center}

AM is used today by several forms of
communication:
\begin{itemize}
\item Two way radios
\item VHF aircraft radios
\item Computer modems
\end{itemize}

\section{Mathematical Characterisation of AM}

The amplitude modulated signal  $y(t)$  can be
represented \textbf{mathematically} as:

\begin{displaymath}
y(t) = [1+M\cdot\cos(2\pi f_{mt} + \phi)]\cdot A
\cdot\sin(2\pi f_{ct})
\end{displaymath}

\end{document}
```

(15 marks)

- 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.

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Rough Working – This page will not be marked

Rough Working – This page will not be marked