THE UNIVERSITY OF AUCKLAND

SECOND SEMESTER, 2017
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	
Forename(s)	
Student ID	**Model**
Login (UPI)	**Answers**

	Question	Mark	Out Of
1 - 30	Multiple Choice		30
31	Programming using Python		10
32	Spreadsheets		15
33	Databases		15
34	HTML5 and CSS		15
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] What would be the least number of bits required per pixel to represent 128 colours?

   (a) 6 bits.
   (b) 5 bits.
   (c) 7 bits.
   (d) 8 bits.
   (e) None of the above.

Question 2
[1 mark] Which of the following statements is FALSE?

   (a) Copyright protects the expression of an idea.
   (b) A patent protects an idea from being copied by others.
   (c) Copyrighted material can be used by others if they have a licence.
   (d) The author of a literary work owns its copyright.
   (e) In New Zealand, all software can be patented.

Question 3
[1 mark] In lectures we talked about using dials to represent decimal numbers. These dials had 10 distinct states – 0 to 9. How many different values could we represent with 3 of these dials?

   (a) 1000
   (b) 8
   (c) 27
   (d) 30
   (e) 999

Question 4
[1 mark] What is the binary equivalent of the decimal number 147?

   (a) 01001001
   (b) 10010010
   (c) 10010011
   (d) 11001001
   (e) None of the above.

Question 5

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

    (a) Jimmy Wales made the first wiki in 1995.
    (b) Vandalism is not a significant issue for Wikipedia.
    (c) Wiki means quick in Haitian.
    (d) Wiki pages are written in plain text, with wiki markup used to add formatting.
    (e) Wikipedia is funded by ad revenue.

Question 6

[1 mark] How much memory (in bits) would be required to store an eight colour image that is 8 pixels high and 10 pixels wide?

    (a) 640 bits.
    (b) 300 bits.
    (c) 240 bits.
    (d) 320 bits.
    (e) 80 bits.

Question 7

[1 mark] What is the ASCII code for *Encoding*?

    (a) 69 110 99 111 100 105 110 103
    (b) 69 78 67 79 68 73 78 71
    (c) 101 110 99 111 100 105 110 103
    (d) 101 78 67 79 68 73 78 71
    (e) None of the above.

Question 8

[1 mark] Which of the following statements about instant messaging (IM) is FALSE?

    (a) Whatsapp and Facebook Messenger are two examples of popular IM applications.
    (b) Conversations sent over IM are never encrypted.
    (c) The IM server stores your IP address and your list of contacts.
    (d) Once connected, a sender and receiver can chat over IM without needing a server.
   (e) IM is a synchronous means of communication.

Question 9

[1 mark] Which of the following is NOT something you would do to prevent or treat Computer Vision Syndrome (CVS)?

    (a) Focus your eyes on a distant object once in a while.
    (b) Use a good quality display with adequate refresh rates and minimal glare.
    (c) Use lubricating eye drops.
    (d) Reduce the distance between your display and yourself.
    (e) Ensure your computer workstation is properly lit.

Question 10

[1 mark] Looking at the image below, which of the following statements is FALSE?
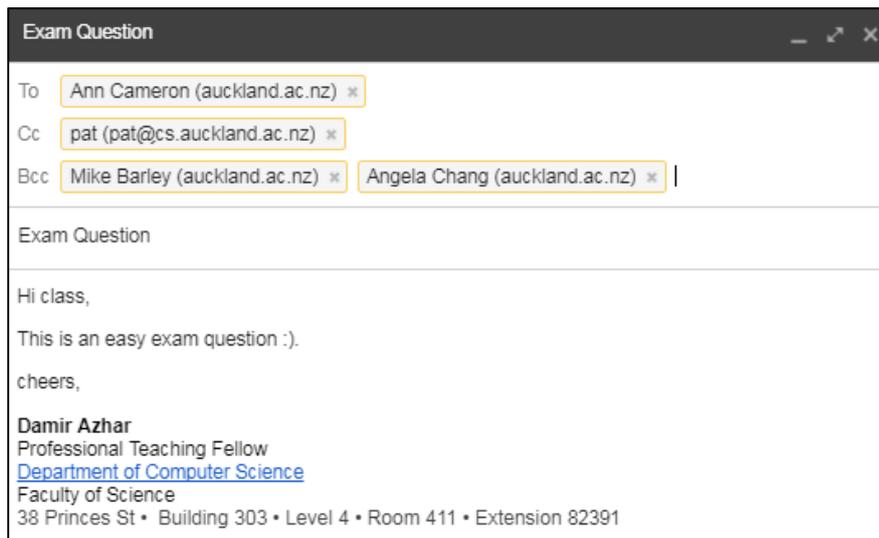
I. Ann is aware that Pat has received this email.
II. Mike is aware that Angela has received this email.
III. Pat is aware that Ann has received this email.
IV. Angela is aware that Mike has received this email.
V. Every recipient is aware of each other.

    (a) II and IV.
    (b) II, IV and V.
    (c) I and III.
    (d) V.
    (e) None of the above.

Question 11

[1 mark] Look at the following PC specifications:

Intel Quad Core I7 CPU.
16GB DDR4 RAM.
120 GB SSD.
2TB HDD.
Windows 10.

If you were going to use this PC to play video games, what additional component would you need to purchase?

    (a) A discrete graphics card.
    (b) A motherboard.
    (c) A water-cooling system.
    (d) An optical drive.
    (e) A RAID mechanism.

Question 12

[1 mark] Ming has downloaded software for free, that lets him edit image files. Every time he starts this software, he gets a message window appearing prompting him to buy the full version of the software. What sort of software is this?

  (a) Open source software.
  (b) Freeware.
  (c) Crippleware.
  (d) Nagware.
  (e) Freemium.

Question 13

[1 mark] What wiki markup would produce the following:

1. **_Very important_**
2. **Important**
3. _Mildly important_

```
(a) #'''''Very important'''''
    #'''Important'''
    #''Mildly important''
(b) #'''''Very important'''''
    #''Important''
    #'''Mildly important'''
(c) *'''''Very important'''''
    *''Important''
    *'''Mildly important'''
(d) *'''''Very important'''''
    *'''Important'''
    *''Mildly important''
```
  (e) None of the above.

Question 14

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

  (a) The World Wide Web has made file sharing much easier.
  (b) P2P networks enable users to share files without using a server.
  (c) Google Drive and Dropbox are examples of cloud storage services.
  (d) Someone who has been given a notice for copyright infringement is able to challenge this notice.
  (e) The Copyright Act 1994 has been amended to deal with copyright infringement carried out via any type of file sharing.

Question 15

[1 mark] John is a software engineer who has recently been passed up for promotion. In response to not getting this promotion, he activates code he has inserted into all of the software projects he has worked on, causing the software to fail. What sort of malware is this code he has activated?

    (a) Logic bomb.

    (b) Trojan.

    (c) Spyware.

    (d) Virus.

    (e) Worm.

Question 16

[1 mark] Adding which of the following content to your own work without acknowledgement would be considered plagiarism?

I.   Text reproduced verbatim.
II. Paraphrased text.
III. Videos.
IV. Images.
V. Graphs.

    (a) III and IV.

    (b) I, II and III.

    (c) I, III, IV and V.

    (d) I, II, III, IV and V.

    (e) None of the above.

Question 17

[1 mark] Which of the following is NOT good advice for the healthy use of technology?

    (a) Increase your social media presence.

    (b) Take regular breaks.

    (c) Eat a healthy diet.

    (d) Use ergonomic office equipment.

    (e) Exercise regularly.

Question 18

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

    (a) Backgrounds should be chosen so that they do not interfere with content.

    (b) A website is made up of webpages that have a consistent look and feel.

    (c) Bandwidth is not an issue when adding media like pictures to a website.

    (d) Links should be easily identifiable and use descriptive link text.

    (e) Colour can be used to reinforce certain content.

Question 19

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

   (a) The first HTML standard, HTML 1.0, was created by Tim Berners Lee in 1993.
   (b) The DTD is used to specify character encoding.
   (c) We use the HTML5 standard in COMPSCI 111.
   (d) HTML files are plain text files that use HTML tags for formatting content.
   (e) UTF-8 is the most commonly used character encoding on the World Wide Web.

Question 20

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

   (a) Artificial Intelligence tries to create computational principles, theories or systems that provide a greater insight on cognition in general.
   (b) Artificial Intelligence tries to engineer, or provide computational principles and engineering techniques for, "useful" artefacts that are arguably intelligent.
   (c) Artificial Intelligence tries to create computational principles, theories or systems that provide a greater insight on cognition in human or animal minds/brains.
   (d) Artificial Intelligence is the computational study of structures and processes that support intelligent behaviour.
   (e) Artificial Intelligence tries to completely define intelligence so we can tell when/whether computers have achieved intelligence.

Question 21

[1 mark] Which one of the following statements regarding Artificial Intelligence is FALSE?

   (a) The cognitive approach believes that what happens internally matters.
   (b) The functional approach is tested by the Chinese Room, while the cognitive approach uses the Turing test.
   (c) Functionalists believe that if it behaves intelligently, it is intelligent.
   (d) The cognitive approach believes that we must consider how it thinks not just look at the behaviour.
   (e) Functionalists believe that external behaviour matters.

Question 22

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

   (a) Tim Berners Lee envisioned a linked information system where pages could be added and accessed by CERN employees.
   (b) Multimedia is the integration of many forms of media (text, video, sound, images).
   (c) Hypermedia is the creation of links between multimedia content.
   (d) Hypertext allows associations to be made between pieces of text.
   (e) None of the above.

Question 23

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

   (a) The Uniform Resource Locator specifies the protocol, domain, path, and resource.

   (b) A web browser is application software used to access content on the WWW.

   (c) A webpage is an ASCII document on the WWW that is usually accessed through a web browser.

   (d) A website is a collection of webpages usually on the same topic or theme.

   (e) A web server is a computer with software that makes files available on the WWW.

Question 24

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

   (a) Networking hardware consists of a connection, network card, switch, router and modem.

   (b) A router directs traffic around the network and connects networks together.

   (c) A network card can support wired and wireless connections.

   (d) A network card must be connected to an expansion slot.

   (e) A switch is used to connect multiple devices to the same network.

Question 25

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

   (a) In packet-switching networks, data is broken into packets, which are then sent on a random route in the network.

   (b) Packet-switching networks were originally developed for the military.

   (c) In circuit-switching networks, switchboard operators originally had to manually connect phone calls. Today this is done electronically.

   (d) In circuit-switching networks, nodes are connected physically via a central node.

   (e) In packet-switching networks, each node on the route sends the packet onto its next destination, avoiding congested or broken nodes.

Question 26

[1 mark] Which of the following did not happen in the 1970's?

   (a) Microsoft was founded.

   (b) GUI's, laser printers, and the mouse were created.

   (c) Apple released the Macintosh computer.

   (d) Apple was founded.

   (e) VisiCalc was released.

Question 27

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

    (a) Desktops brought us closer to an era of "ubiquitous computing".
    (b) Laptops brought us closer to an era of "ubiquitous computing".
    (c) Tablets brought us closer to an era of "ubiquitous computing".
    (d) Smart Phones brought us closer to an era of "ubiquitous computing".
    (e) None of the above brought us closer to an era of "ubiquitous computing".

Question 28

[1 mark] Which of the following is not a business model for computer games?

    (a) Packaged model.
    (b) Free-to-play model.
    (c) Microtransactions model.
    (d) Subscription model.
    (e) Bitcoin model.

Question 29

[1 mark] Which of the following is not a type of computer game genre?

    (a) Role playing.
    (b) First-person shooter.
    (c) Free-to-play.
    (d) Sports.
    (e) Real-time strategy.

Question 30

[1 mark] Which of the following is not an example of secondary memory?

I.   SSD.
II. HDD.
III. CD.
IV. RAM.
V. CPU cache.

    (a) IV and V.
    (b) III, IV and V.
    (c) I, II and III.
    (d) I and II.
    (e) None of the above.

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.

31. Programming Using Python (10 marks)

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

```
count = 6
end = 0
term = count
step = count - 1

while count > end:
    print(term)
    term = term - step
    step = step - 1
    count = count - 1
```

```
6
1
-3
-6
-8
-9
```

(3 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 600 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
increment = 10
sides = 0
end = 6

while sides <= end:
    turtle.forward(steps)
    turtle.right(angle)
    steps = steps + increment
    sides = sides + 1
    angle = 45
```


(3 marks)

(c) In the space below, write a Python program that calculates the average of the first **N** positive cubed numbers. A cubed number is a number we get by multiplying an integer by itself three times. For example, the first four positive cubed numbers are: 1, 8, 27, 64.

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 "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 cubed numbers: 0
Try again: -3
Try again: 4
The average of the first 4 cubed numbers is 25.0
```

```python
n = int(input("Number of cubed numbers: "))
while n <= 0:
    n = int(input("Try again: "))
total = 0
integer = 1
while integer <= n:
    cubed_number = integer ** 3
    total = total + cubed_number
    integer = integer + 1
average = total / n
print("The average of the first", n, "cubed numbers is", average)
```

(4 marks)

32. Spreadsheets (15 marks)

The following spreadsheet displays information about students and the courses they have taken.

	A	B	C	D	E	F	G
1				Student Course Sheet			
2	Name	Course Id	Points	Grade Received	Grade Points	Misc	Mystery
3	Mike	367	15	A+	135	352	0
4	John	111	10	C-	10	101	0
5	Mary	367	15	B	75	352	684
6	Pat	230	30	A+	270	200	0
7	Bob	111	10	A	80	101	0
8							
9							
10	Course Id	Points		Grade	Weight		
11	367	15		A+	9		
12	230	30		A	8		
13	111	10		A-	7		
14				B+	6		
15				B	5		
16				B-	4		
17				C+	3		
18				C	2		
19				C-	1		

(a) Cell **F3** (Misc) calculates the Course Id (**B3**) minus the Points (**C3**). What is the best formula to use in Cell **F3**?

Note: Your formula must be able to be filled down from **F3** to **F7** correctly.

```
= B3 - C3
```

(3 marks)

(b) Cell **G3** displays the Mystery value for the Grade Received (**D3**). If the Grade Received (**D3**) is a "**B**", the Mystery value is calculated as twice the Misc value (**F3**) minus **20** – otherwise the Mystery value is set to zero. What is the best formula to use in Cell **G3**? Your answer must use an **IF** function.

Note: Your formula must be able to be filled down from **G3** to **G7** correctly.

```
=IF( D3 = "B", F3 * 2 – 20, 0 )
```

(5 marks)

(c) Cell **C3** (Points) displays the number of points associated with the Course Id (**B3**). The number of points associated with each Course Id is summarized in the table in cells **A11:B13**. What is the best formula to use in Cell **C3**? Your answer must use the **VLOOKUP** function to retrieve the appropriate points for the Course Id. 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 **C3** to **C7** correctly.

```
= VLOOKUP( B3, $A$11:$B$13, 2, FALSE)
```

(3 marks)

(d) Cell **E3** (Grade Points) contains the product of Points (**C3**) multiplied by the weight of the Grade Received (**D3**). The weight of the grade received can be obtained from the table in cells **D11:E19**. What is the best formula to use in Cell **E3**? Your answer must use the **VLOOKUP** function to retrieve the appropriate weight for the grade received. 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 **E3** to **E7** correctly.

```
= C3 * VLOOKUP(D3, $D$11:$E$19, 2, FALSE)
```

(4 marks)

33. Databases (15 marks)

A local candy store has asked you to make a database for their shop. The following tables show the full contents of the database.

Table: Products

ID	Description	Shop	Price
1	Fizzing Whizbees	1	5.00
2	Chocolate Frogs	2	10.00
3	Sherbert Lemons	1	4.00
4	Bertie Bott's Bean	1	11.00
5	Fizzing Whizbees	2	6.00
6	Chocolate Frogs	1	9.00
7	Sherbert Lemons	2	7.00

Table: Stock

ID	Product	Quantity
1	1	12
2	2	2
3	4	16
4	5	12
5	6	7
6	7	15

Table: Shops

ID	Description	Address
1	Auckland CBD	23 Queen Street
2	Auckland Airport	Airport Galleria

(a) The ID field of each table is its primary key. In the space below, draw a relationship diagram for this database. Make sure to indicate the type of each relationship between tables (e.g. one-to-one, one-to-many, many-to-many).
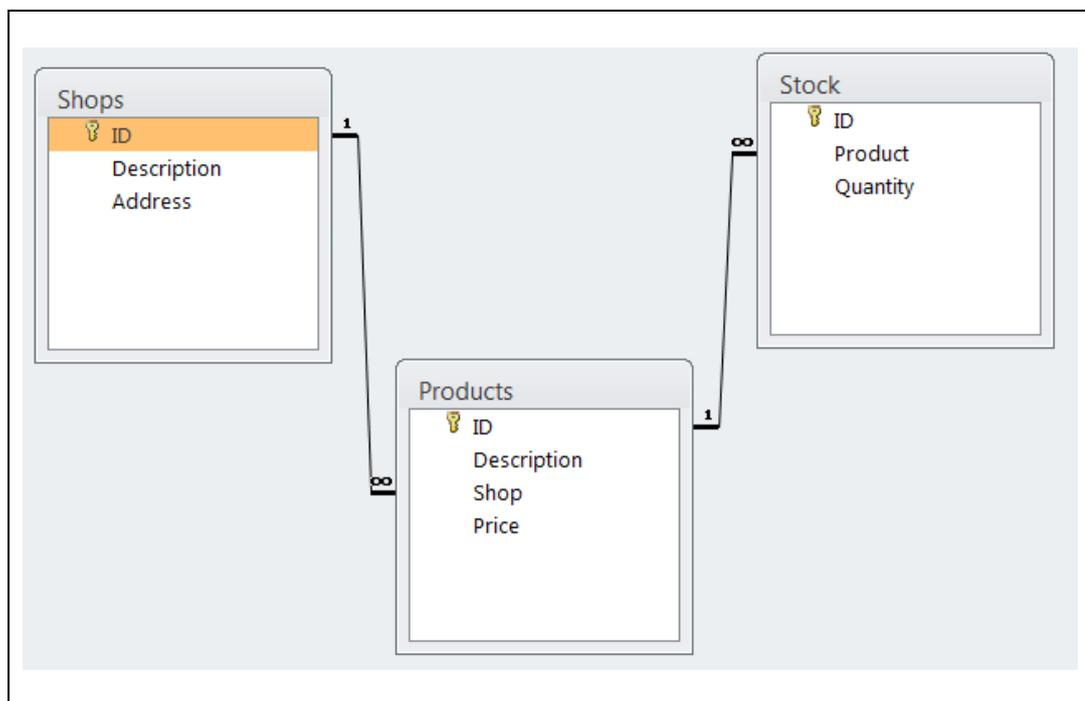
(2 marks)

(b) Specify the foreign keys (if any) in each of the 3 tables.

Products Table: **Shop**

Stock Table: **Product**

Shops Table: **(No foreign keys)**

(3 marks)

(c) In the space below, show the output that the following SQL query would produce.

```
SELECT Description, Price
FROM Products
WHERE Shop = 1 AND Price > 5.00
ORDER BY Description;
```

Description	Price
Bertie Bott's Bean	$11.00
Chocolate Frogs	$9.00

(5 marks)

(d) Complete the Query By Example (QBE) form below so that it generates a query that
displays the **Description**, **Quantity**, and **Price** of all Products sold from the
Auckland CBD store whose **Price** is more than **4.00** and whose **Quantity** is over **8**.
The results should be sorted in **ascending** order based on the **Description.** An
example of the results obtained by running the query is shown below.

Description	Quantity	Price
Bertie Bott's Bean	16	$11.00
Fizzing Whizbees	12	$5.00

Field:	Description	Quantity	Price	Shop
Table:	Products	Stock	Products	Products
Sort:	Ascending			
Show:	✓	✓	✓	☐
Criteria:		>8	>4	1

(5 marks)

34. HTML5 and CSS (15 marks)

The following screenshot shows the body of a web page created using HTML5 and CSS:
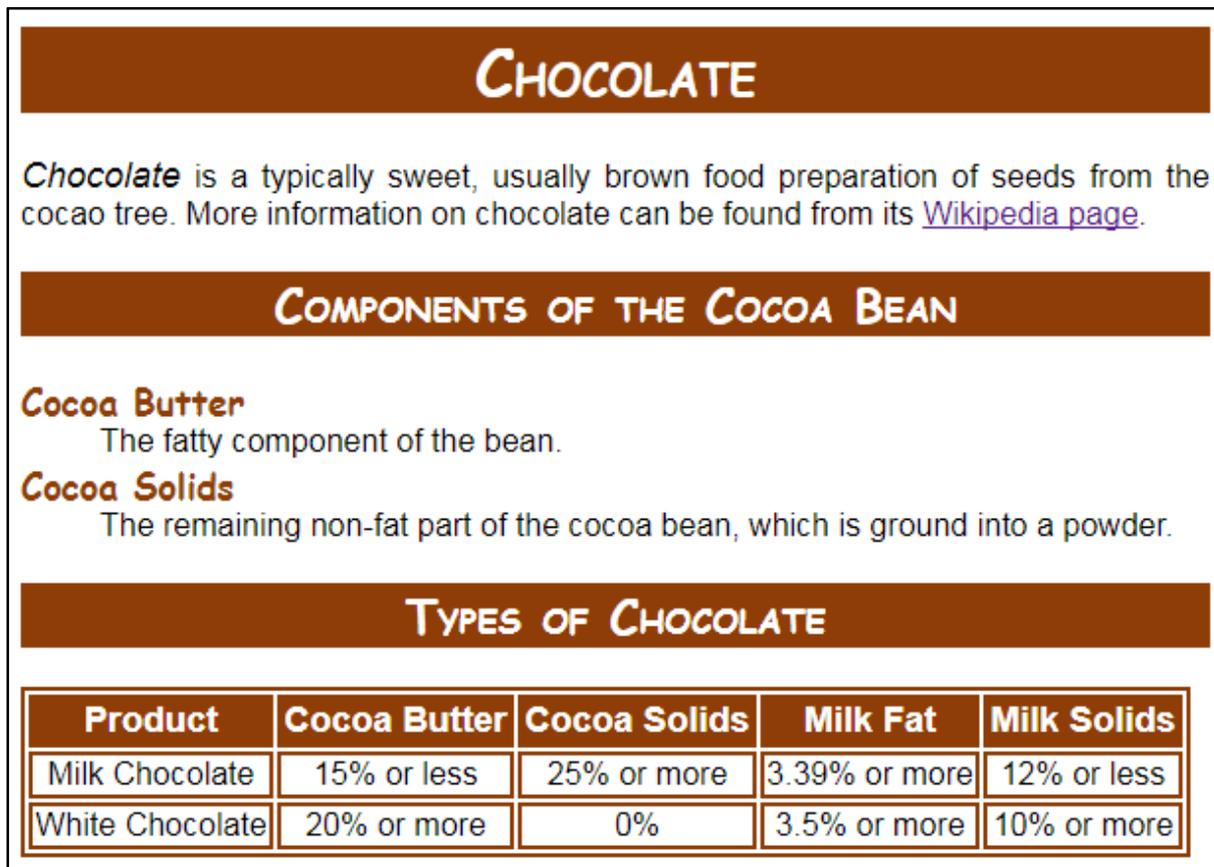
Complete the HTML5 code below so that it produces the output shown above.

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 Wikipedia page is:
"https://en.wikipedia.org/wiki/Chocolate"

```
<!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;
        background-color: rgb(142, 61, 7); color: white;
        font-variant: small-caps; text-align: center}
table, tr, td{border: 2px solid rgb(142, 61, 7)}
#emphasis{font-style: italic; font-size: large}
#tablehead{background-color: rgb(142, 61, 7); color: white;
            text-align: center; font-size: large; font-weight: bold}
.components{font-size: large; font-family: "Comic Sans MS", cursive;
            font-weight: bold; color: rgb(142, 61, 7)}
.tabledata{text-align: center;}
```

```
</style>
</head>
```

```
<body>
```

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

```
<h1>Chocolate</h1>
```

(1 mark)

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

```
<p>
<span id="emphasis">Chocolate</span> is a
typically sweet, usually brown food preparation
of seeds from the cocao tree. More information
on chocolate can be found from its <a
href="https://en.wikipedia.org/wiki/Chocolate">
Wikipedia page</a>.
</p
```

(3 marks)

```
<!-- Components of the Cocoa Bean Section-->
```

```
<section>

<h2>Components of the Cocoa Bean</h2>

<dl>
<dt class="components">Cocoa Butter</dt>
<dd>The fatty component of the bean.</dd>
<dt class="components">Cocoa Solids</dt>
<dd>The remaining non-fat part of the cocoa
bean, which is ground into a powder.</dd>
</dl>

</section>
```

5 marks)

```
<!-- Types of Chocolate Section-->
```

```html
<section>

<h2>Types of Chocolate</h2>

<table>

<tr id="tablehead">
<td>Product</td>
<td>Cocoa Butter</td>
<td>Cocoa Solids</td>
<td>Milk Fat</td>
<td>Milk Solids</td>
</tr>

<tr class="tabledata">
<td>Milk Chocolate</td>
<td>15% or less</td>
<td>25% or more</td>
<td>3.39% or more</td>
<td>12% or less</td>
</tr>

<tr class="tabledata">
<td>White Chocolate</td>
<td>20% or more</td>
<td>0%</td>
<td>3.5% or more</td>
<td>10% or more</td>
</tr>

</table>

</section>
```

(6 marks)

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

35. LaTeX (15 marks)

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

The image is stored in a file called **SineGraph.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.

Normal commands	Environments	Math mode commands
\section{}	itemize	$
\subsection{}	enumerate	\sqrt{}
\includegraphics{}	verbatim	\frac{}{}
\title{}	flushright	\sin
\author{}	center	\theta
\date{}	quote	\sum_{}^{}
\maketitle	displaymath	\infty
\item	equation	^
\usepackage{graphicx}	quotation	_
\textbf{}		

```
\documentclass[a4paper]{article}
\usepackage{graphicx}
\begin{document}
\title{The Sine Function}
\author{Trigo  Nometry}
\date{Semester 2, 2017}
\maketitle

\section{Introduction}
\textbf{Sine} is a trigonometric function of an angle. For an angle $\theta$, the sine of that
angle can be expressed as:
\begin{equation}
\sin(\theta) = \frac{opposite}{hypotenuse}
\end{equation}
A graph of the sine function can be seen below:
\begin{center}
\includegraphics[width=7cm]{SineGraph.png}
\end{center}
\subsection{Taylor Series}
It is possible to express the sine function using the Taylor series:
\begin{equation}
\sin x = \sum^\infty_{n=0}\frac{(-1)^n}{(2n+1)!}x^{2n+1}
\end{equation}
\section{Usage}
The sine function is commonly used to model periodic phenomena such as:
\begin{itemize}
\item sound and light waves
\item average temperature variations during the year
\end{itemize}
\end{document}
```
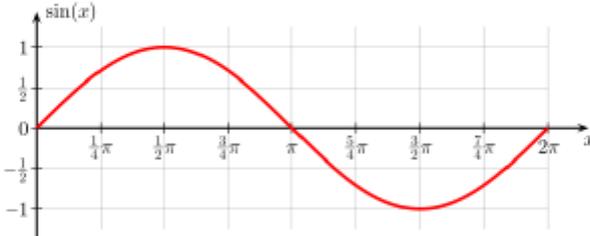
(15 marks)