THE UNIVERSITY OF AUCKLAND

FIRST SEMESTER, 2019
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	
Login (UPI)	

	Question	Mark	Out Of
1 - 30	Multiple Choice		30
31	Programming using Python		10
32	Spreadsheets		12
33	Databases		13
34	HTML5 and CSS		20
35	LaTeX		15
	TOTAL		100

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SECTION A : MULTIPLE CHOICE QUESTIONS

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] A $5000 desktop in year Y takes around 96 seconds to perform a calculation. A $5000 desktop in 2019 takes around 6 seconds to do the same calculation. What year is Y according to Moore's Law as taught in the lectures?

    (a) 2016.
    (b) 2018.
    (c) 2013.
    (d) 2015.
    (e) 2014.

Question 2
[1 mark] Which of the following memory types is arranged in decreasing order of access time?

    (a) CPU Cache > RAM > SSD.
    (b) RAM > CPU Cache > SSD.
    (c) CPU Cache > SSD > RAM.
    (d) SSD > CPU Cache > RAM.
    (e) SSD > RAM > CPU Cache.

Question 3
[1 mark] Which of the following statements about HDD is FALSE?

    (a) Data is read and written from an HDD by moving heads.
    (b) An HDD consumes less power than an SSD.
    (c) An HDD is a cheap storage medium.
    (d) An HDD stores data on spinning magnetic disks.
    (e) An HDD is fragile.

Question 4
[1 mark] Consider the following equation: $x + y = z$. Here, $x = 100011_2$ and $z = 101000_2$. What is y as represented in decimal format?

    (a) 40
    (b) 0
    (c) 35
    (d) 10
    (e) 5

Question 5

[1 mark] What is the binary equivalent of 23?

   (a) 10001
   (b) 11111
   (c) 10111
   (d) 10101
   (e) 11110

Question 6

[1 mark] If we want to represent 261 different values, how many bits would we need?

   (a) 5
   (b) 7
   (c) 8
   (d) 6
   (e) 9

Question 7

[1 mark] A dial has 4 different states. Given a machine that uses 4 dials, how many different numbers can we represent?

   (a) 256
   (b) 4
   (c) 128
   (d) 1000
   (e) 0

Question 8

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

   (a) Freeware is proprietary software that is free to use.
   (b) Nagware is shareware that keeps reminding the user to purchase the full version of the software.
   (c) Freeware can be a loss leader or adware.
   (d) The source code of a freeware is publicly available.
   (e) Commercial software is proprietary software that a user must purchase to use.

Question 9
[1 mark] Which of the following is NOT an example of system software?

   (a) Eclipse.
   (b) Mac OS X.
   (c) Windows 10.
   (d) Device Drivers.
   (e) Disk Cleanup.

Question 10
[1 mark] Which of the following statements about IP v4 is FALSE?

   (a) The maximum addresses possible with IP v4 is approximately 4.3 billion addresses.
   (b) 1.0.1.0 is a valid IP v4 address.
   (c) An IP v4 address is a 32-bit number.
   (d) 197.200.326.100 is a valid IP v4 address.
   (e) The IP v4 address is made up of 4 groups of octets.

Question 11
[1 mark] Which of the following statements about the Internet is FALSE?

   (a) The Internet is an example of a circuit-switched network.
   (b) End systems access the Internet through an ISP.
   (c) Internet applications run on end systems.
   (d) End systems run protocols that control the sending and receiving of information within the Internet.
   (e) End systems are located at the edge of the Internet.

Question 12
[1 mark] Which of the following statements about IMAP is FALSE?

   (a) IMAP makes it easier for a user to access emails from multiple devices.
   (b) IMAP generally requires an Internet connection to read downloaded messages.
   (c) IMAP is used for retrieving email messages from the recipient's mail server.
   (d) IMAP downloads the email message to the email client and usually deletes the message from the mail server.
   (e) IMAP allows organizing emails into folders.

Question 13

[1 mark] What Wiki markup would need to be used to create the following list?

1. Guava
2. *Mango*
   - Alphonso
   - Dasheri
3. Durian

(a) #Guava
    #~Mango~
    #*Alphonso
    #*Dasheri
    #Durian

(b) #Guava
    #"Mango"
    ##Alphonso
    ##Dasheri
    #Durian

(c) #Guava
    #'Mango'
    #*Alphonso
    #*Dasheri
    #Durian

(d) *Guava
    *'Mango'
    *#Alphonso
    *#Dasheri
    *Durian

(e) #Guava
    #"Mango"
    #*Alphonso
    #*Dasheri
    #Durian

Question 14

[1 mark] Which of the following is NOT a microblogging platform?

    (a) Instagram.
    (b) Tumblr.
    (c) Pinterest.
    (d) Facebook.
    (e) Twitter.

Question 15

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

    (a) HTTP is the protocol used by web browsers to request resources from web servers.
    (b) Tim Berners-Lee invented the WWW.
    (c) Mozilla, released in 1993, was the first widely used web browser.
    (d) The first web site was created at CERN.
    (e) The World Wide Web Consortium was established to create standards for the WWW.

Question 16

[1 mark] The Stuxnet malware is an example of which of the following?

    (a) Spyware.
    (b) Trojan.
    (c) Ransomware.
    (d) Logic bomb.
    (e) Worm.

Question 17

[1 mark] Which of the following is the ASCII code for *WiLD*?

    (a) 118 105 114 102
    (b) 86 87 91 78 99
    (c) 84 73 76 68
    (d) 87 105 76 68
    (e) 115 117 114 102

Question 18

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

(a) There are two types of section breaks: Continuous and Next Page.
(b) A page break splits your document's pages into sections that can have a different format or layout.
(c) Formatting symbols are non-printing characters that are used to mark spaces, paragraphs, etc. in a document.
(d) A footnote is a small note at the bottom of the page.
(e) An endnote appears at the end of the document.

Question 19

[1 mark] Which of the following is an example of a physical health issue related to technology?

(a) Mood Disorders.
(b) Narcissism.
(c) Occupational Overuse Syndrome.
(d) Distraction.
(e) Instant Gratification.

Question 20

[1 mark] Which of the following statements about health and technology is FALSE?

(a) Moderate noise on a regular basis can lead to hearing loss.
(b) Studies have suggested that social media exacerbates and even encourages narcissism.
(c) Younger people show a stronger urge to report their activities on social media.
(d) Symptoms of CVS include hearing loss.
(e) Depression may be transmittable through technological interaction.

Question 21

[1 mark] Consider a rectangular image that can store 64 unique colours. The image is 200 pixels high and 100 pixels wide. How much computer memory would be required to store this image?

(a) 12 KB.
(b) 64 bytes.
(c) 18 bytes.
(d) 24 bytes.
(e) 15 KB.

Question 22

[1 mark] Which of the following statements about image compression algorithms is FALSE?

    (a) JPEG works by averaging out colours of nearby pixels.

    (b) JPEG is good for compressing photos, but works poorly for compressing graphics.

    (c) GIF uses a lossy compression algorithm.

    (d) Colour JPEG images store 24 bits per pixel, and are thus capable of displaying more than 16 million colours.

    (e) PNG was developed as a replacement for GIF.

Question 23

[1 mark] Who wrote the first algorithm for a computer to play Chess?

    (a) Leslie Lamport.

    (b) Steve Jobs.

    (c) Donald Knuth.

    (d) Alan Turing.

    (e) Dan Bricklin.

Question 24

[1 mark] Name a perfect information game.

    (a) Super Mario.

    (b) Poker.

    (c) Civilization.

    (d) World of Warcraft.

    (e) Chess.

Question 25

[1 mark] What was Gordon Moore known for?

    (a) Developing the BASIC programming language.

    (b) Co-founding Xerox PARC.

    (c) Co-founding Intel Corporation.

    (d) Developing VisiCalc.

    (e) Founding Microsoft.

Question 26
[1 mark] Which of the following companies was one of the first to use the Qwerty keyboard?

  (a) Remington.
  (b) Xerox.
  (c) Apple.
  (d) Microsoft.
  (e) IBM.

Question 27
[1 mark] Which of the following best describes the philosophical viewpoint put forward by the Chinese Room thought experiment?

  (a) If a person cannot differentiate between a machine and another person when communicating with them, the machine is intelligent.
  (b) Without understanding, a machine's activity cannot be described as intelligent.
  (c) If a machine does not understand Chinese, it is not intelligent.
  (d) The occupant of the room is intelligent.
  (e) Matching symbols is all that is required for a machine to be intelligent.

Question 28
[1 mark] What is the current success of AI largely due to?

  (a) Breakthroughs in AI techniques.
  (b) Better programming.
  (c) Increases in processing power and data storage.
  (d) Machine Learning.
  (e) The Singularity.

Question 29
[1 mark] What game did Deep Blue play?

  (a) Checkers.
  (b) Backgammon.
  (c) Solitaire.
  (d) Chess.
  (e) Poker.

Question 30

[1 mark] How is knowledge commonly encoded in knowledge based AI systems?

    (a) In objects.
    (b) In a Genetic algorithm.
    (c) As a Neural Network.
    (d) In machine code.
    (e) As If-Then rules.

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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 (10 marks)

(a) In mathematics, the factorial of a number n is expressed as $n!$. This can be calculated as:

$$n! = n * (n - 1) * (n - 2) * ... * 1$$

For example $5! = 5 * 4 * 3 * 2 * 1 = 120$. The value of 0! and 1! are defined as 1.

Write a Python program that calculates and displays the factorial of a value entered by the user. You can assume that the user will always enter an integer value between 0 and 15. Here are two examples of the program running with different values entered by the user. User input is indicated with bold and italicized font.
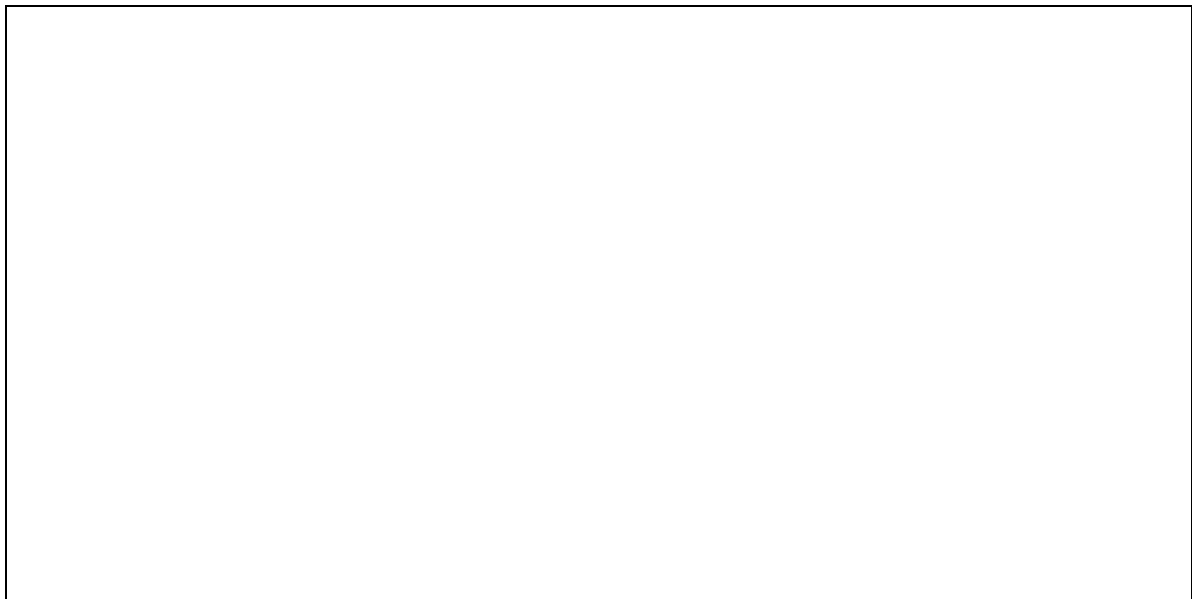
Example:
```
Enter a value for n: 5
The factorial of 5 is 120

Enter a value for n: 0
The factorial of 0 is 1
```

(4 marks)

(b) Show the output of the following program.

```
variable = "x"
count = 1
end = 7
while count < end:
    if count % 2 == 1:
        if count == 1:
            print(variable)
        else:
            print(variable,"^",count,"/",count,"!")
    count = count + 1
print("Done!")
```
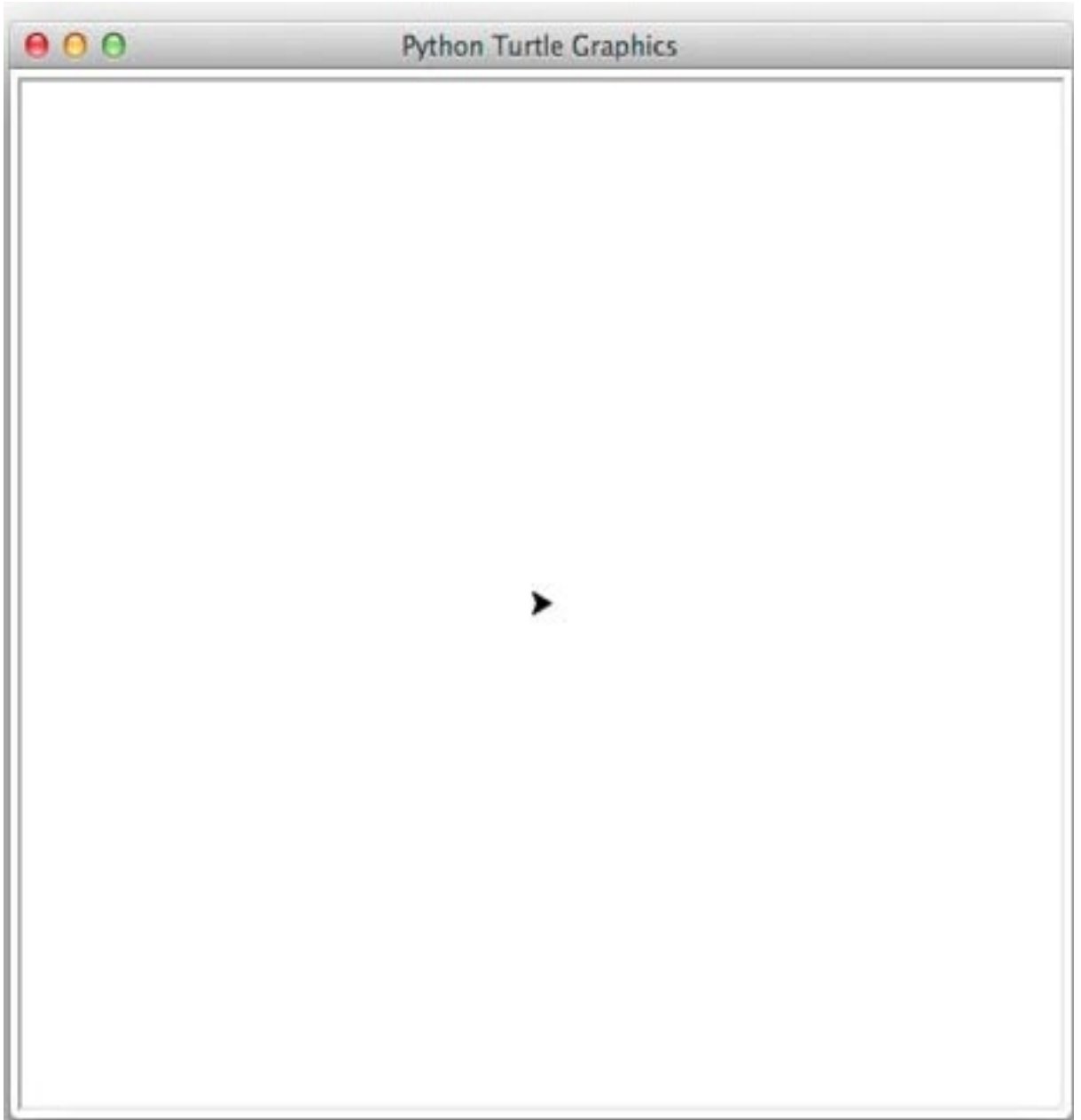
(3 marks)

(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 400 steps wide.

```
import turtle

steps = 200
angle = 120
sides = 6
count = 0

while count < sides:
    turtle.forward(steps)
    if count < 3:
        turtle.left(angle)
    else:
        turtle.right(angle)
    count = count + 1
```

(3 marks)

32. Spreadsheets (12 marks)

The following spreadsheet displays information about product sales in a small company.

	A	B	C	D	E	F	G	H	I	J
1										
2		Customer ID	Item Code	Quantity	Total Price	City	Island	Base Rate	Shipping Price	Final Price
3		16	15	2	$46.00	Auckland	North	$10.00	$5.00	$51.00
4		175	25	3	$45.00	Rangiora	South	$20.00	$20.00	$65.00
5		175	20	2	$80.00	Rangiora	South	$20.00	$20.00	$100.00
6		567	15	4	$92.00	Wellington	North	$10.00	$5.00	$97.00
7		567	25	3	$45.00	Wellington	North	$10.00	$5.00	$50.00
8		78	20	4	$160.00	Christchurch	South	$20.00	$15.00	$175.00
9		234	15	4	$92.00	Hamilton	North	$10.00	$10.00	$102.00
10										
11										
12		Customer ID	City	Island						
13		16	Auckland	North			Item Code	15	20	25
14		78	Christchurch	South			Item Name	Gremlin T-shirt	Dr Who Cap	Star Wars Cap
15		175	Rangiora	South			Item Price	$23.00	$40.00	$15.00
16		234	Hamilton	North						
17		567	Wellington	North						

(a) Columns B to J contain a customer's order. What is the best formula to use in Cell **E3** to find the total price of the product ordered? The price table is located in Cells **H13 : J15**. Your answer must use a **HLOOKUP** function.

Note: Your formula must be able to be filled down from **E3** to **E9** correctly.

=HLOOKUP (_____,_____,_____,_____) * _____

(4 marks)

(b) Cell **I3** indicates the shipping price, which is based on the city. If the city is Auckland, Wellington or Christchurch, this is calculated as $5 less than the base rate stored in **H3**. For all other cities, the shipping price is taken directly from the base rate in **H3**. What is the best formula to use in Cell **I3** to calculate the shipping price?

Note: Your formula must be able to be filled down from **I3** to **I9** correctly.

```
=IF (_____

_____, _____, _____)
```

(4 marks)

(c) Cell **F3** indicates the shipping city based on who the customer is. What is the best formula to use in Cell **F3** to find the customer's city? The Customer table is located in Cells **B13 : D17**. Your answer must use a **VLOOKUP** function. The Customer ID is located in Cell **B3**.

Note: Your formula must be able to be filled down from **F3** to **F9** correctly.

```
=VLOOKUP (_____, _____, _____, _____)
```

(4 marks)

33. Databases (13 marks)

A movie theatre has a database to keep track of its ticket sales. The three tables below (Discount, Person and Orders) form part of that database. Tickets are priced according to the Day and Time of day, and the Person type (Adult, Student or Retired).

Here are the contents of each of the three tables in datasheet view:

Discount

Day/Time	Discount Percent
⊞ Week-Day	-20
⊞ Weekend-Day	0
⊞ Weekend-Evening	20
⊞ Week-Evening	10

Person

Type	Base Cost
⊞ Adult	25
⊞ Retired	20
⊞ Student	15

Orders

Order Number	Person Type	Day/Time	Number
1	Student	Week-Evening	2
2	Retired	Week-Day	1
3	Adult	Weekend-Evening	3
4	Student	Weekend-Evening	3
5	Retired	Week-Day	1
6	Adult	Week-Evening	2

(a) State the **primary** key(s) of the **Person** table.

Primary Key(s):

(1 mark)

(b) State the **primary** key(s) and **foreign** key(s), if any, of the **Orders** table.

Primary Key(s):

Foreign Key(s):

(2 marks)

(c) Show the output of the following QBE query:

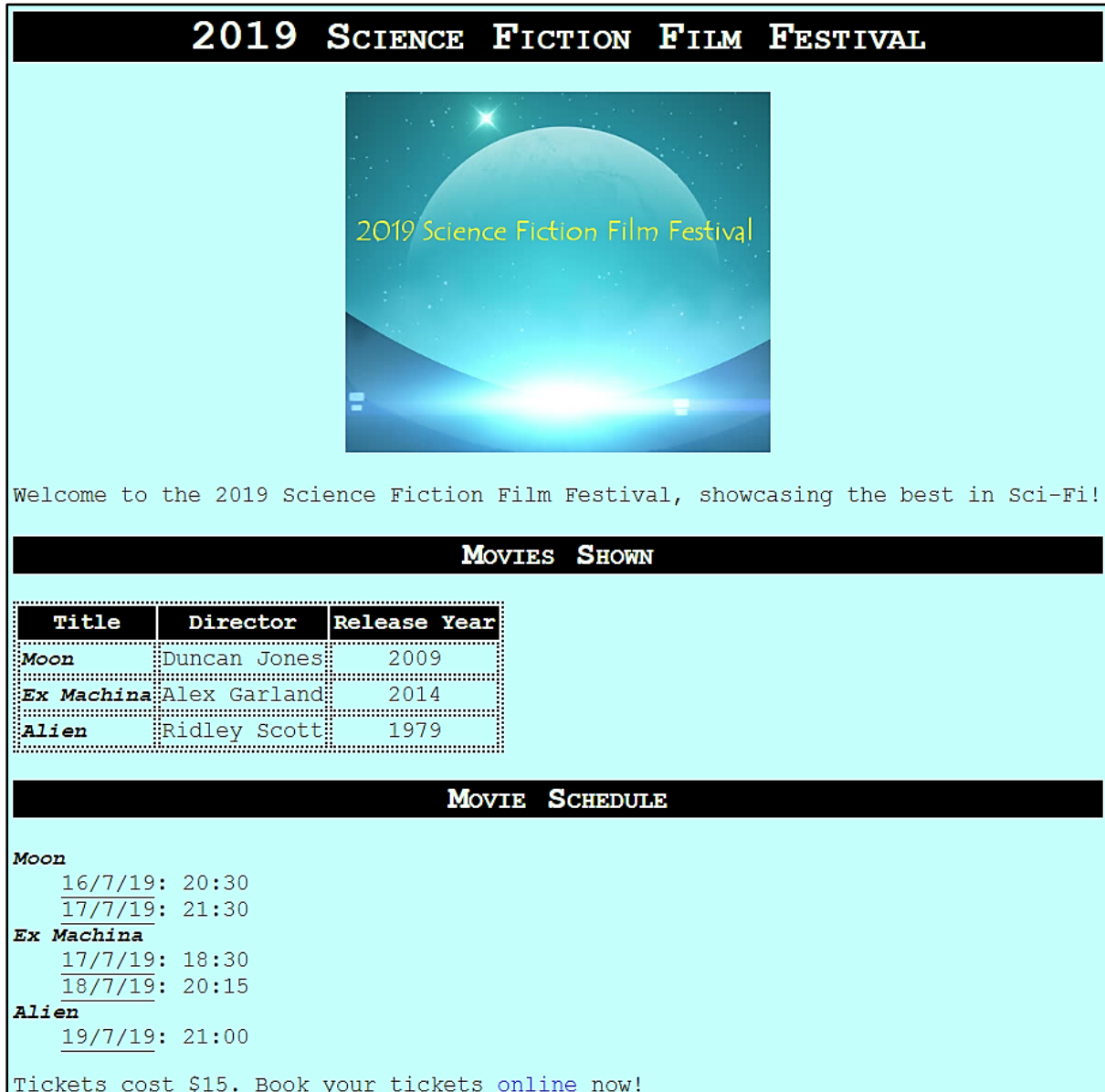| Field:	Person Type	Day/Time	Base Cost	Number
Table:	Orders	Orders	Person	Orders
Total:	Group By	Group By	Group By	Sum
Sort:	Ascending	Ascending		
Show:	☑	☑	☑	☑
Criteria:				

(4 marks)

(d) In the space below, write an SQL query that displays the **Person Type, Day/Time,** and **Number** from the **Orders** table where the **number of tickets** is more than **1** and the **Day/Time** is not **"Week-Evening"**. The output should be displayed in ascending order by **Order Number**. An example of the results obtained by running the query is shown below.

Person Type	Day/Time	Number
Adult	Weekend-Evening	3
Student	Weekend-Evening	3

(6 marks)

34. HTML5 and CSS (20 marks)

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

Complete the HTML5 code on the following pages so that it produces the output shown above.

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

Note:

(1) The URL for booking tickets for the film festival is:
    "http://www.2019scififestivaltickets.co.nz".

(2) The image is stored in a file called **"Banner.png"** in the same folder as the HTML file.

(3) There are two sections (the "Movies Shown" section and the "Movie Schedule" section).

```
<!DOCTYPE html>
<html lang="en">
<head>
<meta charset="UTF-8">
<title>HTML/CSS Exam Question</title>
<style>
 body {background-color:#C4FFFC; font-family: "Courier",
       Monospace; text-align:justify; font-size: 14pt}
 h1,h2 {background-color:rgb(0,0,0); color:#E6FFE6;
        font-variant:small-caps; text-align:center}
 table, tr, td {border: 2px dotted black}
 #center {text-align:center}
 #tablehead {background-color:rgb(0,0,0); color:#E6FFE6;
             font-weight:bold; text-align:center}
 .title {font-style: italic; font-weight:bold;
         font-size: large}
 .year {text-align:center}
 .date {border-bottom-color: black; border-bottom-width: 1px;
        border-bottom-style:solid}
</style>
</head>
```
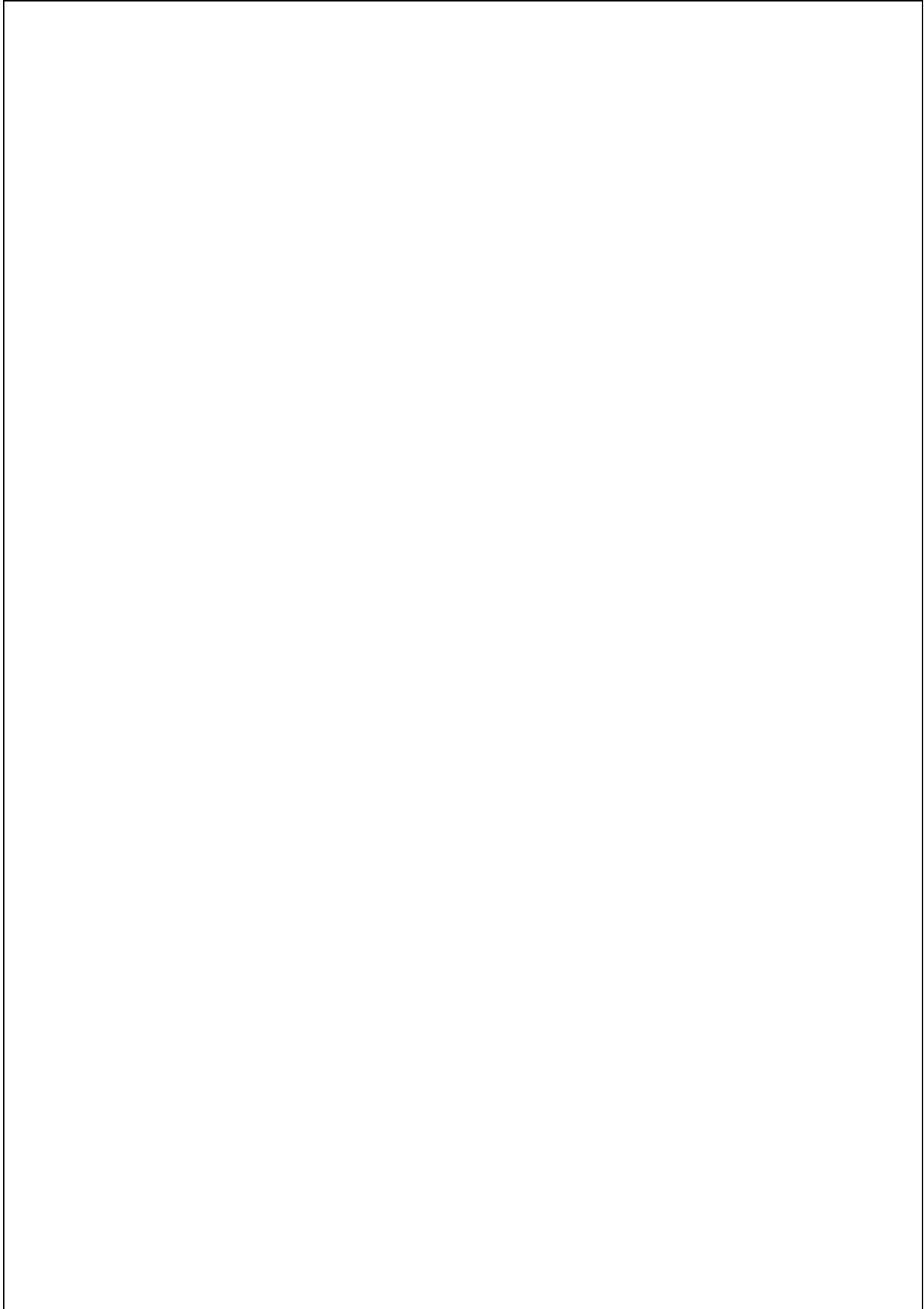
```
<body>
```

<!-- Main Heading -->

(1 mark)

<!-- image -->

(3 marks)

<!-- First Paragraph -->

(1 mark)

```
<!-- "Movies Shown" Section -->
```

(7 marks)

<!-- "Movie Schedule" Section -->

(8 marks)

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

35. LaTeX (15 marks)

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

<div style="border: 1px solid black; padding: 20px;">

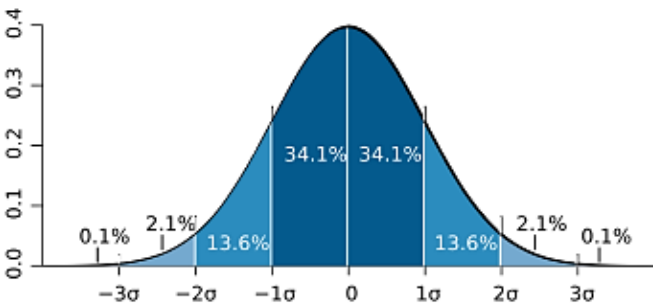<div align="center">

Percentiles

Statish Tishan*

Semester 1, 2019

</div>

1   Introduction

A **percentile** is used to indicate the value below which a given percentage of observations in a group of observations falls.

1.1   The Normal Distribution and Percentiles

Percentiles are often represented by reference to a normal curve plot (as seen below).

The x-axis is scaled to standard deviations or sigma (σ) units. We can see that:

- -1σ is the 15.87th percentile.

- 0σ is the 50th percentile.

- $+1\sigma$ is the 84.13th percentile.

1.2   Calculating the Percentile

The P-th percentile ($0 < P \leq 100$) of a value in a list of N ordered values is calculated as:

$$P = \frac{100}{N}\left(x - \frac{1}{2}\right) \tag{1}$$

where x is the position of the value in the list.

---

*inspired by Wikipedia

<div align="center">

1

</div>

</div>

The images are stored in a file called **NormalCurve.png** and is in the same folder as the LaTeX code. When inserted into the document, the image should be **centred** and **8 cm wide**.

The following LaTeX commands have been included as a reference. You will not need to use all of these commands.

Normal commands	*Environments*	*Math mode commands*
\usepackage{graphicx}	itemize	$
\section{}	enumerate	\sqrt{}
\subsection{}	verbatim	\frac{}{}
\title{}	flushright	\leq
\author{}	center	\sum_{}^{}
\date{}	quote	\infty
\maketitle	displaymath	\sigma
\item	equation	^
\textbf{}	quotation	
\ldots		_
\includegraphics{}		\left(
\footnote{}		\right)

```
\documentclass[a4paper]{article}

\begin{document}
```

```
\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.

Rough Working – This page will not be marked

Rough Working – This page will not be marked

_____

Rough Working – This page will not be marked