

THE UNIVERSITY OF AUCKLAND

FIRST SEMESTER, 2018
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	Model
Forename(s)	Answers
Preferred Name	
Student ID	
Login (UPI)	

	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

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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 of the following is an example of primary memory?

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

Question 2

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

- (a) They are fragile.
- (b) They have a long operating life.
- (c) They store data on spinning magnetic disks.
- (d) They operate silently.**
- (e) They are a cheap storage media.

Question 3

[1 mark] Which of the following is NOT an input device?

- (a) Printer.**
- (b) RFID tag.
- (c) Webcam.
- (d) Mouse.
- (e) Biometrics scanner.

Question 4

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

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

Question 5

[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 4 of these dials?

- (a) 999
- (b) 10000
- (c) 100
- (d) 1000
- (e) 9999

Question 6

[1 mark] What is the decimal equivalent of the binary number 10100?

- (a) 10
- (b) 100
- (c) 200
- (d) 20
- (e) 30

Question 7

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

- (a) MP3 is an example of a file format.
- (b) File formats are used by the operating system to determine which program to use to open a particular file.
- (c) File formats can be based on a standard.
- (d) A program will generally be unable to read a file that uses a file format that it does not understand.
- (e) File formats can be proprietary or free to use.

Question 8

[1 mark] Which of the following is NOT application software?

- (a) Disk Cleanup.
- (b) Firefox.
- (c) Apache Open Office.
- (d) Microsoft Office.
- (e) GIMP.

Question 9

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

- (a) The Internet Protocol defines routing information.
- (b) Internet applications run on end systems.
- (c) The Internet backbone is made up of high-capacity fibre optic cables laid on land and under the sea.
- (d) The Internet is a circuit-switched network.**
- (e) An IP address is a unique identifier for computers on the Internet.

Question 10

[1 mark] What is the maximum number of unique IP addresses possible in the case of IP version 4?

- (a) 2^{64}
- (b) 2^{18}
- (c) 2^{32}**
- (d) 2^8
- (e) 2^{128}

Question 11

[1 mark] Which protocol is used by email clients to retrieve email messages from email servers?

- (a) IP
- (b) IMAP**
- (c) SMTP
- (d) FTP
- (e) UDP

Question 12

[1 mark] Who developed the first wiki?

- (a) Larry Sanger.
- (b) Mark Zuckerberg.
- (c) Bill Gates.
- (d) Jimmy Wales.
- (e) Ward Cunningham.**

Question 13

[1 mark] Which of the following would be used in the Stage One Wiki to add a link to an internal page named COMPSCI 111 Exam?

- (a) {COMPSCI 111 Exam}
- (b) {{COMPSCI 111 Exam}}
- (c) [[COMPSCI 111 Exam]]
- (d) [COMPSCI 111 Exam]
- (e) COMPSCI 111 Exam

Question 14

[1 mark] How does a cache work together with a proxy server?

- (a) The cache ensures the request is genuine before sending it to the proxy server.
- (b) The cache stores a copy of recent requests sent to the proxy server so that they can be accessed quickly.
- (c) Caches and proxy servers are two separate devices that cannot work together.
- (d) The cache prevents unauthorized access to the proxy server.
- (e) The cache sends requests slowly to the proxy server to ensure the server does not get overloaded.

Question 15

[1 mark] What are the programs that follow links from web pages and gather information from those web pages to create entries for a search engine index called?

- (a) Firmware.
- (b) Androids.
- (c) Ants.
- (d) Bees.
- (e) Spiders.

Question 16

[1 mark] Which of the following is a type of malware deliberately inserted into a program which runs when a certain condition is fulfilled?

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

Question 17

[1 mark] Which one of the following statements about treating Computer Vision Syndrome (CVS) is FALSE?

- (a) Use proper lighting within computer workstation area.
- (b) Use appropriate screen distance and position.
- (c) Use medicated eye drops.
- (d) Take frequent work breaks.
- (e) Use lubricating eye drops.

Question 18

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

- (a) Instant gratification is the desire to experience pleasure or fulfilment without delay or deferment.
- (b) Checking is repeatedly accessing your digital device interrupting your current activity.
- (c) Always-online digital devices have increased impatience and unrealistic expectations.
- (d) Most students can check their digital devices in class without missing any information.
- (e) Digital devices are highly pervasive and cognitively penetrating.

Question 19

[1 mark] What is the ASCII code for LiDAR?

- (a) 108 105 100 97 114
- (b) 76 105 68 65 82
- (c) 108 105 68 97 82
- (d) 76 73 68 65 82
- (e) 108 73 100 97 114

Question 20

[1 mark] Which of the following does the ASCII code 75 97 121 97 107 represent?

- (a) KAYAK
- (b) kayaK
- (c) kayak
- (d) KaYak
- (e) Kayak

Question 21

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

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

Question 22

[1 mark] In game design, what are aesthetics?

- (a) A synonym for genre.
- (b) The cumulative effect of thousands of micro design decisions.
- (c) The style of the game's artwork.
- (d) The way the game looks.
- (e) The emotions evoked by the game.**

Question 23

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

Question 24

[1 mark] What is wrong with bi-polar morality scales in games?

- (a) They inhibit roleplay.**
- (b) They reduce spatial presence.
- (c) They reduce re-playability.
- (d) They interfere with embedded narratives.
- (e) They are offensive to the mentally ill.

Question 25

[1 mark] How many bytes are required to store a bitmap image that is 100 pixels wide, 40 pixels high, and uses 16 colours?

- (a) 1500 bytes.
- (b) 2000 bytes.**
- (c) 16,000 bytes.
- (d) 12,000 bytes.
- (e) None of the above.

Question 26

[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) II and III.
- (b) I, IV and V.
- (c) II, III and V.**
- (d) I and II.
- (e) I, II and V.

Question 27

[1 mark] What historical event led to the production of the electronic digital computers Colossus and ENIAC?

- (a) The Cold War.
- (b) The Space Race.
- (c) The American Civil War.
- (d) World War II.**
- (e) The Great Depression.

Question 28

[1 mark] Which of the following computers was the first commercially available personal computer?

- (a) Apple I.
- (b) Altair 8800.**
- (c) Commodore 64.
- (d) IBM PC.
- (e) Compaq 386.

Question 29

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

- (a) A human tester has to determine the IQ of a machine.
- (b) A machine has to determine the IQ of a human tester.
- (c) A human tester has to decide whether he is communicating with a machine or a human.
- (d) If a human tester cannot distinguish between a human and a machine, the tester fails the test.
- (e) If a test machine mistakes another machine for a human, it fails the test.

Question 30

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

- (a) Some researchers think that computers will never be intelligent.
- (b) Some researchers think that computers will be intelligent in 20 years' time.
- (c) Some researchers think that for computers to be intelligent they must be massively parallel like the human brain.
- (d) Researchers have agreed on what it means for a computer to be intelligent.
- (e) Early researchers thought intelligent computers would have appeared by the year 2000.

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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.

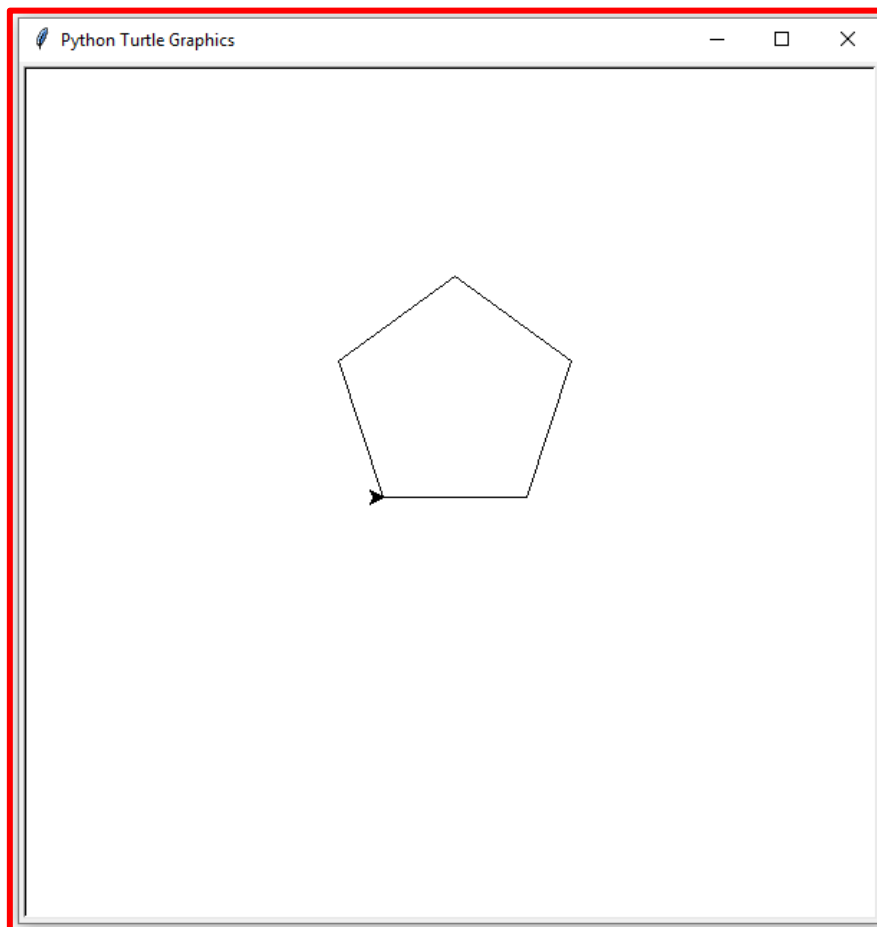
31. Programming Using Python (10 marks)

- (a) 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
turtle.backward(50)
n = 5
angle = 360 / n
count = 0
while count < n:
    turtle.forward(100)
    turtle.left(angle)
    count = count + 1
```



(5 marks)

- (b) Write a program that calculates and displays the area of a triangle. The prompts and output must be formatted as per the two examples below.

At the beginning, the user is asked to enter the base and height of the triangle **in metres**. The user may enter these two values with a decimal point.

The area of a triangle is half of the base multiplied by the height.

If the area is over 1 square kilometre (1,000,000 square metres) then it is displayed in square kilometres, otherwise it is displayed in square metres.

Example 1: If the user entered **4000** for the base and **3000** for the height, the output that is expected from your program is shown below:

```
Enter base (metres): 4000
Enter height (metres): 3000
Triangle area is 6.0 square kilometres.
```

Example 2: If the user entered **10** for the base and **2.5** for the height, the output that is expected from your program is shown below:

```
Enter base (metres): 10
Enter height (metres): 2.5
Triangle area is 12.5 square metres
```

```
base = float(input("Enter base (metres): "))
height = float(input("Enter height (metres): "))
area = base * height / 2
if area > 1000000:
    area = area / 1000000
    print("Triangle area is", area, "square kilometres")
else:
    print("Triangle area is", area, "square metres")
```

(5 marks)

32. Spreadsheets (15 marks)

All parts of this question refer to the spreadsheet shown below. The left side of the spreadsheet shows a table of prices per kilogram for different fruit and vegetables. The right side of the spreadsheet shows a list of sales of particular food items.

	A	B	C	D	E	F	G	H	I	J	K
1											
2		Food Price Per Kg			Food Sales						
3		Apple	\$0.50		Sale	Type	Price per Kg	Weight (Kg)	Wheelbarrow	Price	Running Total
4		Banana	\$0.80		1	Apple	\$0.50	8.0	N	\$4.00	\$4.00
5		Carrot	\$0.75		2	Banana	\$0.80	10.0	N	\$8.00	\$12.00
6		Eggplant	\$3.14		3	Apple	\$0.50	4.0	N	\$2.00	\$14.00
7		Garlic	\$1.62		4	Carrot	\$0.75	16.0	Y	\$12.00	\$26.00
8		Lettuce	\$1.00		5	Lettuce	\$1.00	6.0	N	\$6.00	\$32.00
9		Onion	\$0.20		6	Onion	\$0.20	10.0	N	\$2.00	\$34.00
10		Orange	\$0.42		7	Pear	\$0.60	5.0	N	\$3.00	\$37.00
11		Pear	\$0.60		8	Lettuce	\$1.00	12.0	Y	\$12.00	\$49.00
12					9	Apple	\$0.50	14.0	Y	\$7.00	\$56.00
13					10	Onion	\$0.20	20.0	Y	\$4.00	\$60.00
14											
15										Average Price per Sale:	\$6.00

- (a) In cell **J15** the average price of the sales from the list directly above is shown. What is the best formula to use in cell **J15**?

= AVERAGE (J4:J13)

(2 marks)

- (b) Cell **I4** records whether a wheelbarrow is needed (“Y”) or not (“N”) for the sale. A wheelbarrow is needed if the weight (**H4**) is **over 10 kg**. What is the best formula to use in cell **I4**? **Note:** The formula must be able to be filled down.

=IF (H4 > 10 , "Y" , "N")

(3 marks)

- (c) Cell **J4** records the total price of the sale item (**Price per Kg** multiplied by **Weight**).
What is the best formula to use in cell **J4**? **Note:** The formula must be able to be filled down.

= G4 * H4

(1 mark)

- (d) Cell **G4** uses a VLOOKUP formula to look up the **Price per Kg** of the food item in cell **F4**.

The syntax of the **vlookup** function is given below:

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

What is the best formula to use in cell **G4**?

Note: The formula **must** use the VLOOKUP function to get the appropriate price per kg from the table in cells **B3:C11** and **must** be able to be filled down.

VLOOKUP (F4, \$B\$3:\$C\$11, 2, FALSE)

(5 marks)

- (e) In **one** sentence, explain why you chose the value you used for **range_lookup** above.

I chose FALSE for the range_lookup because we needed an exact match - we were not looking to find what range it was in.

(1 mark)

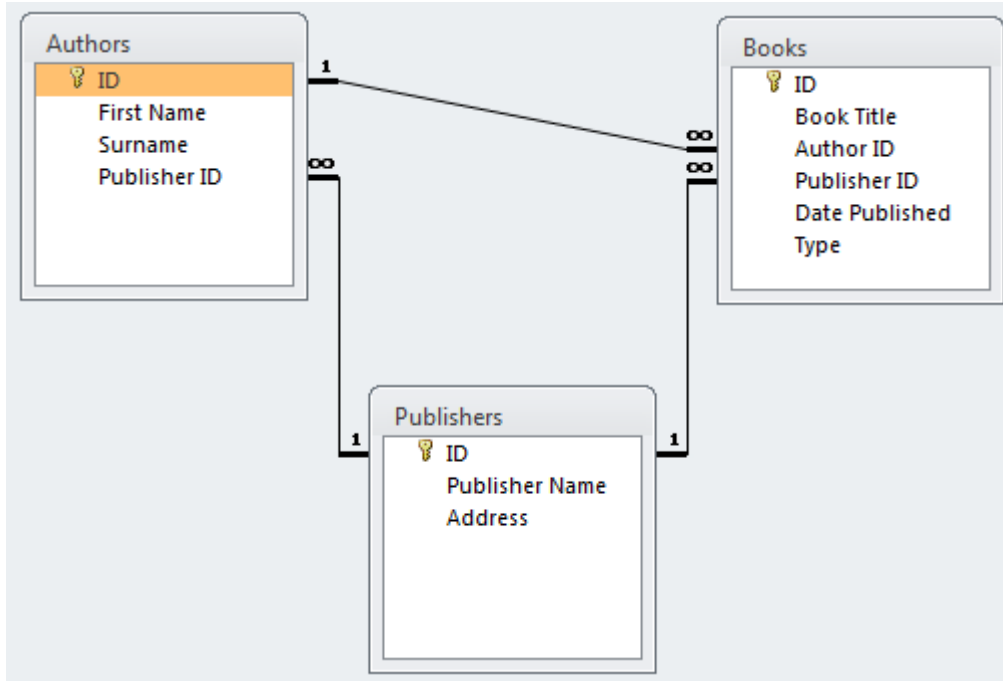
- (f) Cell **K4** displays the total price of all sales up to that point. What is the best formula to use in cell **K4**? **Note:** The formula must be able to be filled down.

= SUM (\$J\$4:J4)

(3 marks)

33. Databases (15 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 key(s) in the **Authors** table.

Publisher ID

(2 marks)

(b) What is the appropriate **data type** for the **Author ID** field in the **Books** table?

Number

(2 marks)

- (c) Complete the query by example (QBE) form below so that it generates a query that displays the **Book Title**, Author's **Surname**, and **Publisher Name** of every book whose **Type** is **"Paperback"**. The results are to be sorted in ascending order based on the **Book Title**. Some example results from the query might be:

Book Title	Surname	Publisher Name
Abarat	Barker	Doubleday
Cujo	King	Scribner
Pet Sematary	King	Scribner
Song Of Kali	Simmons	Knopf
The Lost World	Crichton	Viking Press
The Racketeer	Grisham	Bluejay Books
The Shining	King	Scribner

Field:	Book Title	Surname	Publisher Name	Type
Table:	Book	Author	Publisher	Book
Sort:	Ascending			
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Criteria:				"Paperback"
or:				

(6 marks)

- (d) Write an SQL query that displays the **Book Title** and **Publisher Id** of all books whose type is **"Paperback"**. The results should be sorted in **ascending order** based on the **Publisher Id**. Some example results from the query might be:

Book Title	Publisher Id
Pet Sematary	1
Cujo	1
The Shining	1
The Lost World	2
Song Of Kali	3
Abarat	4
The Racketeer	5

```

SELECT [Book Title], [Publisher Id]
FROM Books
WHERE Type = "Paperback"
ORDER BY [Publisher Id];
    
```

(5 marks)

34. HTML5 and CSS (15 marks)

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

What is Privacy?

Alan Westin defined four states of privacy:


- solitude
- intimacy
- anonymity
- reserve

Cambridge Analytica is a consulting firm which mines data for the electoral process.

Facebook

The data of **50 million** Facebook users were harvested.

Mark Zuckerberg



Mark has expressed disbelief that so many people would willingly hand over their information.

Elections possibly affected

Country	Election
USA	2016 Presidential
U.K.	2016 Brexit

More information can be found on [Cambridge Analytica's wikipedia page](#).

Complete the HTML5 code on the following three 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 the Wikipedia page is:
“https://en.wikipedia.org/wiki/Cambridge_Analytica”.
- (2) The image is stored in a file called "**Mark.jpg**".
- (3) There are four sections. Each section is preceded by a comment.

```
<!DOCTYPE html>
<html lang="en">
<head>
<meta charset="UTF-8">
<title>HTML/CSS Exam Question</title>
<style>
  h2 {color: white; background-color:black;}
  h3 {color: black; background-color:LightGray;}
  table, tr, td { border: 2px solid black;}
  #emphasis{font-weight:bold; color:red;}
  .center {text-align:center;}
</style>
</head>
```

```
<body>
```

```
<!-- "What is Privacy?" Section -->
```

```
<section>
<h2>What is Privacy?</h2>
<p>
Alan Westin defined four statesof privacy:
</p>
<ul>
  <li>solitude</li>
  <li>intimacy</li>
  <li>anonymity </li>
  <li>reserve</li>
</ul>
<p>
Cambridge Analytica is a consulting firm which mines
data for the electoral process.
</p>
</section>
```

(4 marks)

<!-- Facebook Section -->

```
<section>
<h3>Facebook</h3>
<p>
The data of <span id="emphasis">50 million</span>
Facebook users were harvested.
</p>
</section>
```

(3 marks)

<!-- Mark Zuckerberg Section -->

```
<section>
<h3>Mark Zuckerberg</h3>
<p class="center">

</p>
<p>
Mark has expressed disbelief that so many people
would willingly hand over their information.
</p>
</section>
```

(3 marks)

<!-- Elections Section -->

```
<section>
```

```
<h3> Elections possibly affected </h3>
```

```
<table>
```

```
  <tr><td>Country</td><td>Election</td></tr>
```

```
  <tr><td>USA</td><td>2016 Presidential</td></tr>
```

```
  <tr><td>U.K.</td><td>2016 Brexit</td></tr>
```

```
</table>
```

```
<p>More information can be found on <a  
href="https://en.wikipedia.org/wiki/Cambridge_Analyti  
ca">
```

```
Cambridge Analytica's wikipedia page</a>.
```

```
</p>
```

```
</section>
```

(5 marks)

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

35. LaTeX (15 marks)

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

Benford's Law

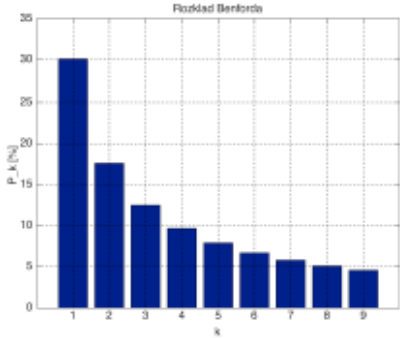
Dr. Wiki Pedia
First Semester 2018

1 Introduction

Benford's law is an observation about distribution of leading digits.

1.1 Distribution of Digits

Figure of digit distributions below:



Digit (k)	Probability P_k (%)
1	30.1%
2	17.6%
3	12.5%
4	9.7%
5	7.9%
6	6.7%
7	5.8%
8	5.1%
9	4.6%

1.2 Definition

A set of numbers is said to satisfy Benford's law if the leading digit d ($d \in 1, \dots, 9$) occurs with probability

$$P(d) = \log_{10}(d+1) - \log_{10}(d) = \log_{10}\left(\frac{d+1}{d}\right) = \log_{10}\left(1 + \frac{1}{d}\right)$$

1.3 Probabilities

The distributions are as follows:

1. 30.1%
2. 17.6%
3. 12.5%
4. 9.7%

The image displayed at the end of the first subsection is stored in a file called **Histogram.png** and is in the same folder as the LaTeX code. When inserted into the document, the image should be **centred** and **6 cm wide**.

The following LaTeX commands have been included as a reference. You will not need to use all of these commands. The symbol \in in the Definition subsection is represented by `\in`.

<i>Normal commands</i>	<i>Environments</i>	<i>Math mode commands</i>
<code>\section{}</code>	itemize	$\$$
<code>\subsection{}</code>	enumerate	$\%$
<code>\includegraphics{}</code>	verbatim	$\frac{\{\}}{\{\}}$
<code>\title{}</code>	flushright	\log
<code>\author{}</code>	center	\ldots
<code>\date{}</code>	quote	$\sum_{\{\}}^{\{\}}$
<code>\maketitle</code>	displaymath	∞
<code>\item</code>	equation	\in
<code>\usepackage{graphicx}</code>	quotation	\wedge
<code>\emph{}</code>		$-$

```

\documentclass[a4paper]{article}

\usepackage{graphicx}

\begin{document}

\title{Benford's Law}
\author{Dr. Wiki Pedia}
\date{First Semester 2018}
\maketitle
\section{Introduction}
Benford's law is an observation about distribution
of leading digits.
\subsection{Distribution of Digits}
Figure of digit distributions below:
\begin{center}
\includegraphics[width=6cm]{Histogram.png}
\end{center}
\subsection{Definition}
A set of numbers is said to satisfy Benford's law
if the leading digit  $\$d\$$  ( $\$d\$ \in \{1, \dots, 9\}$ )
occurs with probability
    
```

```
\begin{displaymath}
P(d)=\log_{10}(d+1)-\log_{10}(d)
=\log_{10}\left(\frac{d+1}{d}\right)
=\log_{10}\left(1+\frac{1}{d}\right)
\end{displaymath}
\subsection{List of Probabilities}
The distributions are as follows:
\begin{enumerate}
\item $30.1\%$
\item $17.6\%$
\item $12.5\%$
\item $9.7\%$
\end{enumerate}
```

(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