THE UNIVERSITY OF AUCKLAND

SECOND 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	
Forename(s)	
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] Using Moore's Law as taught in lectures, approximately how much faster would a PC be today when compared to an identically priced PC in 2003?

   (a) 1000 times faster.
   (b) 10 times faster.
   (c) 250 times faster.
   (d) 100 times faster.
   (e) 500 times faster.

Question 2
[1 mark] Which of the following is NOT an example of secondary storage?

   (a) Blu-ray disc.
   (b) Solid state drive.
   (c) USB drive.
   (d) Hard disk drive.
   (e) CPU cache.

Question 3
[1 mark] What is the binary equivalent of 157?

   (a) 10011101
   (b) 10111011
   (c) 1011101
   (d) 10111001
   (e) 11011101

Question 4
[1 mark] The Icelandic alphabet has 32 letters. How many bits would be required to represent both the lowercase and uppercase characters in this alphabet?

   (a) 8
   (b) 6
   (c) 16
   (d) 5
   (e) 4

Question 5
[1 mark] Which of the following statements are TRUE?

I.   Programs are stored and executed from secondary memory.
II. HTML is an open standard file format.
III. In Windows 10, Notepad is the default program for opening files with a .txt file extension.
IV. Anti-virus software and a firewall can be used to protect your computer from malware.
V. Windows 10 is an example of application software.

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

Question 6
[1 mark] Which of the following statements is FALSE?

   (a) Embedded systems software can be patented in New Zealand.
   (b) A patent protects an idea from being copied by others.
   (c) When you purchase proprietary software, you are purchasing the copyright for the software.
   (d) You need a licence to use copyrighted material.
   (e) None of the above.

Question 7
[1 mark] Which of the following is NOT a valid IPv4 address?

   (a) 1.1.1.1
   (b) 255.255.0.0
   (c) 234.111.131.244
   (d) 136.128.157.34
   (e) 192.168.256.1

Question 8
[1 mark] Which of the following does TCP do?

I.   Divides messages into packets.
II. Error detection.
III. Flow control.
IV. Combines packets to recreate a message.
V. Defines routing information.

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

Question 9
[1 mark] Which of the following statements is FALSE?

   (a) The administrator of your mail server can read your emails.
   (b) 2FA is malware used to intercept emails while they are in transit.
   (c) An employer is generally allowed to read an employee's emails on the company's email system.
   (d) The Unsolicited Electronic Messages Act 2007 regulates commercial electronic messages in New Zealand.
   (e) PGP is a form of encryption that can be used to make emails more secure.

Question 10
[1 mark] Which of the following forms of communication are synchronous?
I.   Instant messaging.
II. Emails.
III. Forum posts.
IV. SMS.
V. Telephone calls.

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

Question 11

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

(a) Blog posts are typically displayed in reverse chronological order.
(b) Privacy is not an issue with blogs.
(c) Blogs can be used to spread misinformation.
(d) Blogs can generate revenue through advertising.
(e) Blogs can be used for harassment.

Question 12

[1 mark] What wiki markup would produce the following content?

Study *more*!

Facebook less!

(a) `Study '''more'''!`
    `[[https://www.facebook.com|Facebook]] less!`
(b) `Study ''more''!`
    `[https://www.facebook.com Facebook] less!`
(c) `Study ''more''!`
    `[facebook.com Facebook] less!`
(d) `Study ''more''!`

    `[facebook.com Facebook] less!`
(e) `Study ''more''!`

    `[https://www.facebook.com Facebook] less!`

Question 13

[1 mark] What is the ASCII code for the word "Editor"?

(a) 69 100 105 116 111 114
(b) 68 99 104 115 110 113
(c) 70 101 106 117 112 115
(d) 100 99 104 115 110 113
(e) 101 100 105 116 111 114

Question 14

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

    (a) Two sections divided by a continuous section break can be formatted independently of each other.

    (b) Two sections divided by a "next page" section break cannot be formatted independently of each other.

    (c) "Justify" is a type of paragraph alignment.

    (d) You can adjust the spacing between paragraphs and between lines within a paragraph.

    (e) A style is a named group of formatting decisions.

Question 15

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

    (a) The default behaviour of the Google search engine is to not give you personalized results.

    (b) Filter bubbles occur when a search algorithm offers personalised results, which limits the diversity of information presented to the user.

    (c) Personalised search results risks isolating people within their own bubble of information.

    (d) Examples of filter bubbles include Facebook's News Feed and Google's personalised search results.

    (e) Personalised search results can help people to find relevant information.

Question 16

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

    (a) A proxy sits between the client and the server so that it can intercept and process requests.

    (b) A firewall prevents unauthorised access to a private network.

    (c) A cache stores recently requested resources so they can be accessed quickly.

    (d) A firewall can be between the proxy and the client or between the proxy and the server.

    (e) A proxy can use a cache to store recent requests, enabling it to process requests faster.

Question 17

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

    (a) It makes it difficult for authorities to track criminal activity online.

    (b) It discourages free expression online, especially around sensitive or personal issues.

    (c) People use anonymity to harass and offend other people.

    (d) It supports other rights such as the right to privacy.

    (e) It makes it difficult to authenticate whether a message (e.g., email) is from the purported sender.

Question 18

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

   (a) A virus runs and spreads itself when the program is opened.
   (b) A virus inserts itself into another program.
   (c) Spyware is mostly used by foreign governments to collect data on other countries.
   (d) A worm is similar to a virus except it doesn't need a program in order to run.
   (e) A worm spreads by itself.

Question 19

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

   (a) A desire for instant gratification can lead to "checking".
   (b) Instant gratification is the desire to experience pleasure or fulfilment without delay or deferment.
   (c) Digital devices, which are always online, have raised the expectation for immediate gratification.
   (d) A desire for instant gratification has led to a decrease in impatience because people receive so much gratification.
   (e) A desire for instant gratification has led to expecting immediate responses to social media posts or texts.

Question 20

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

   (a) Lubricating eye drops help prevent CVS.
   (b) CVS results from focusing eyes on a computer or other display device for long, uninterrupted periods of time.
   (c) Taking regular breaks away from the computer helps to prevent CVS.
   (d) The prevention of CVS includes proper lighting within the computer workstation area and appropriate screen distance and position.
   (e) The symptoms of CVS include: dry eyes, blurred/double vision, eyestrain, red/irritated eyes, and blindness.

Question 21

[1 mark] Imagine you have taken a picture with a 9 megapixel digital camera. For ease of calculation, assume that the picture is square, not rectangular. Assume that you are displaying this image on a screen that has 1000 dots across. How much of the image would be displayed?

    (a) $\frac{1}{3}$ of the image.

    (b) $\frac{1}{4}$ of the image.

    (c) $\frac{1}{9}$ of the image.

    (d) $\frac{1}{6}$ of the image.

    (e) $\frac{1}{2}$ of the image.

Question 22

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

    (a) Portable Network Graphics (PNG) is a lossy method.
    (b) Graphics Interchange Format (GIF) supports 8-bit colour (256 colours).
    (c) Graphics Interchange Format (GIF) is a lossless method.
    (d) Portable Network Graphics (PNG) supports 24-bit colour (over 16 million colours).
    (e) Joint Photographic Experts Group (JPEG) averages nearby colours.

Question 23

[1 mark] The goal(s) of Artificial Intelligence is to ...

I.   enable models to be built exploring how people are able to behave intelligently.
II. understand the essence of intelligence without regard to how it is built.
III. create artificial systems that behave intelligently.

    (a) I and II only.
    (b) II only.
    (c) I only.
    (d) III only.
    (e) All 3.

Question 24

[1 mark] Which of the following best describes Searle's argument about intelligence as put forward by the Chinese Room problem?

  (a) If a system behaves intelligently then it can be considered to be intelligent.
  (b) Matching symbols is all that is required for a machine to be intelligent.
  (c) How a system produces seemingly intelligent behaviour must be taken into account when judging whether it is intelligent.
  (d) If a machine does not understand Chinese, it is not intelligent.
  (e) If a person cannot differentiate between the responses from the machine or another person when communicating with them, then the machine is intelligent.

Question 25

[1 mark] In which decades were the laser printer invented and the Apple Macintosh released?

  (a) Both in 1970's.
  (b) 1960's and 1970's.
  (c) 1960's and 1980's.
  (d) 1970's and 1980's.
  (e) Both in 1980's.

Question 26

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

  (a) The ability of other manufacturers to clone IBM PCs increased IBM's domination of the PC market.
  (b) Apple's Macintosh computer was the first to use the desktop metaphor to organise its GUI.
  (c) Apple Macintosh computers were originally purchased as kits and needed to be assembled by the customer.
  (d) VisiCalc was a program created by Microsoft.
  (e) PC-DOS, IBM's operating system for its PC, was simply IBM's rebranding of Microsoft's MS-DOS.

Question 27

[1 mark] Which of the following game genres are combat oriented?

I. Sports games.
II. Turn-based strategy games.
III. Third-person shooters.
IV. Platform games.

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

Question 28

[1 mark] Which of the following are types of business models for computer games?

I. Packaged games.
II. Pay-to-Play.
III. Macrotransactions.
IV. Downloadable content.
V. Subscription games.

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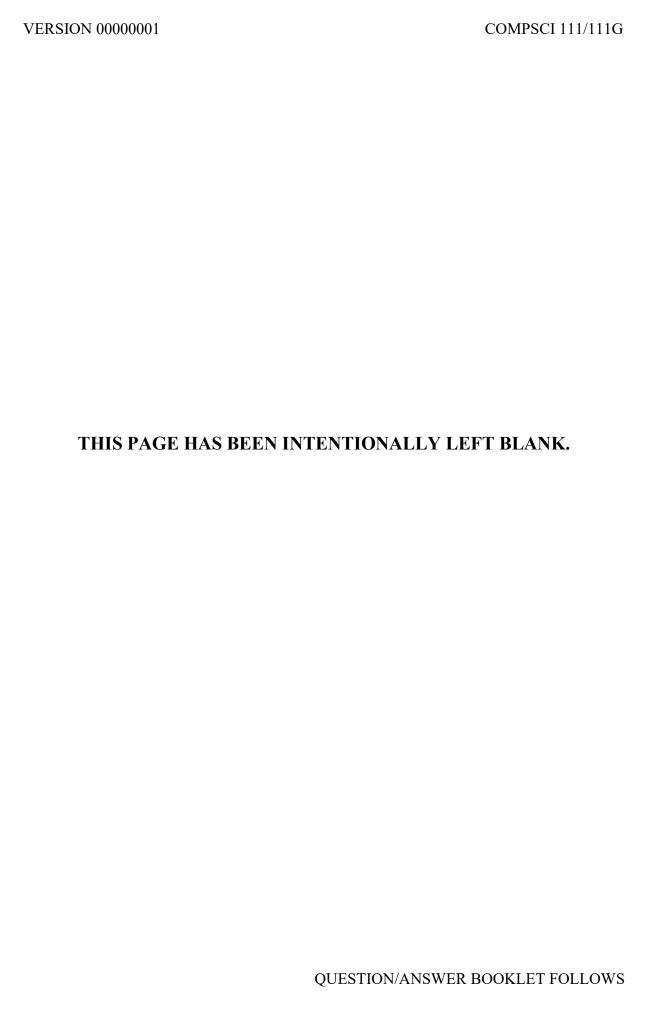   (d) All of them.
    (e) I and III.

Question 29

[1 mark] With regard to digital game design, as taught in this class, which of the following is an experience element?

    (a) Narrative Mechanics.
    (b) Dynamics.
    (c) Game Mechanics.
    (d) Embedded narratives.
    (e) None of the above.

Question 30
[1 mark] With regard to game design theory, as taught in this class, which of the following statements is FALSE?

(a) Aesthetics are considered an experience element.

(b) Interpreted narratives are considered player elements.

(c) If a gamepad and a mouse are used in playing a game, they are considered to be artifact elements.

(d) Non-human agents are considered as players.

(e) None of the above.

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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) What is the output of the following program?

```
num1 = 7
num2 = 5
result = num2 + ((num2 * 2 - num1) ** 2) / 2
print("Result:", result)
```

Result: **9.5**

(2 marks)

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

```
num1 = 2
value2 = "1"
result = int(value2 * num1) // 2
print("Result:", result)
```

Result: **5**

(2 marks)

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

```
index = 1
while index < 5:
    print(index * 2)
    index = index + 3
```
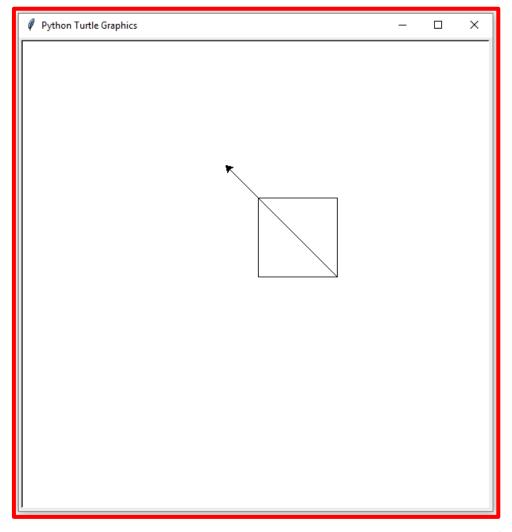
2
8

(2 marks)

(d) 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).

```python
import turtle

steps = 100
angle = 90
sides = 0
end = 5
longer_steps = 200

while sides < end:
    turtle.forward(steps)
    turtle.left(angle)
    sides = sides + 1
turtle.left(angle // 2)
turtle.forward(longer_steps)
```


(4 marks)

32. Spreadsheets (15 marks)

The following spreadsheet displays information about product sales in a small clothing company. The price table is in Columns A and B.

	A	B	C	D	E	F	G	H	I	J
1	Product	Price		Name	Order	Price	Quantity	Discount	Sub-Total	Total
2	Backpack-Small	15.99		Peter	Shirt-Medium	16.99	3	0.1	50.97	45.873
3	Backpack-Large	18.99		Paul	Jacket-Large	36.99	2	0.1	73.98	66.582
4	Jacket-Small	32.99		Mary	Backpack-Small	15.99	6	0.2	95.94	76.752
5	Jacket-Medium	34.99							Total	189.207
6	Jacket-Large	36.99								
7	Shirt-Small	15.99								
8	Shirt-Medium	16.99								
9	Shirt-Large	17.99								
10	Sweatshirt-Small	18.99								
11	Sweatshirt-Medium	19.99								
12	Sweatshirt-Large	20.99								

(a) Cell **E2** indicates the product ordered by the customer. What is the best formula to use in Cell **F2** to find the price of the item ordered? The price table is located in Cells **A2 : B12**. Your answer must use a **VLOOKUP** function.

Note: Your formula must be able to be filled down from **F2** to **F4** correctly.

```
=VLOOKUP(E2, $A$2:$B$12, 2, FALSE)
```

(5 marks)

(b) Cell **G2** indicates the quantity ordered by a customer. What is the best formula to use in Cell **H2** to calculate the discount that the customer gets?   The discount is 0.2 if the quantity is over 5 and the discount is 0.1 otherwise. Your answer must use an **IF** function.

Note: Your formula must be able to be filled down from **H2** to **H4** correctly.

```
=IF(G2 > 5, 0.2, 0.1)
```

(3 marks)

(c) Cell **I2** indicates the subtotal price which is calculated by multiplying the price by the quantity ordered. What is the best formula to use in Cell **I2**?

Note: Your formula must be able to be filled down from **I2** to **I4** correctly.

```
= F2 * G2
```

(2 marks)

(d) Cell **J2** indicates the total price which is calculated by applying the discount to the sub-total. For example, if the discount is 0.1, it is 10% off the sub-total. The total price for Peter's order is:

Total = 50.97 * (1 - 0.1)

What is the best formula to use in Cell **J2**?

Note: Your formula must be able to be filled down from **J2** to **J4** correctly.

```
= I2 * (1 - H2)
```
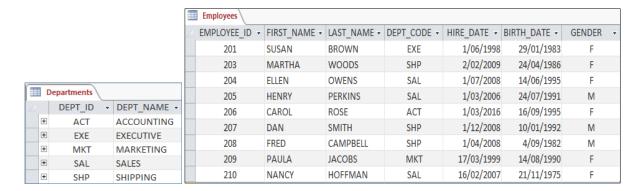
(3 marks)

(e) Cell **J5** indicates the total SUM of all orders. What is the best formula to use in Cell **J5**?

```
= SUM(J2:J4)
```

(2 marks)

33. Databases (15 marks)

Consider the following tables in a company's database:

EMPLOYEE_ID	FIRST_NAME	LAST_NAME	DEPT_CODE	HIRE_DATE	BIRTH_DATE	GENDER
201	SUSAN	BROWN	EXE	1/06/1998	29/01/1983	F
203	MARTHA	WOODS	SHP	2/02/2009	24/04/1986	F
204	ELLEN	OWENS	SAL	1/07/2008	14/06/1995	F
205	HENRY	PERKINS	SAL	1/03/2006	24/07/1991	M
206	CAROL	ROSE	ACT	1/03/2016	16/09/1995	F
207	DAN	SMITH	SHP	1/12/2008	10/01/1992	M
208	FRED	CAMPBELL	SHP	1/04/2008	4/09/1982	M
209	PAULA	JACOBS	MKT	17/03/1999	14/08/1990	F
210	NANCY	HOFFMAN	SAL	16/02/2007	21/11/1975	F

Departments

DEPT_ID	DEPT_NAME
ACT	ACCOUNTING
EXE	EXECUTIVE
MKT	MARKETING
SAL	SALES
SHP	SHIPPING

(a) State the **primary** key of the **Departments** table.

> Primary Key: **DEPT_ID**

(1 mark)

(b) State the **primary** key and **foreign** key of the **Employees** table.

> Primary Key: **EMPLOYEE_ID**
>
> Foreign Key: **DEPT_CODE**

(2 marks)

(c) In the space below, draw the relationship diagram, indicating the relationship between the **Departments** table and the **Employees** table.

(4 marks)

(d) Show the output of the following query:

Field:	DEPT_NAME	EMPLOYEE_ID
Table:	Departments	Employees
Total:	Group By	Count
Sort:		
Show:	☑	☑
Criteria:		
or:		

DEPT_NAME ▾	CountOfEMPLOYEE_ID ▾
ACCOUNTING	1
EXECUTIVE	1
MARKETING	1
SALES	3
SHIPPING	3

(3 marks)

(e) In the space below, write an SQL query that displays the **last name**, **first name** and the **date of birth** of all **female** employees in the **SALES** department. The details are to be displayed in descending order based on LAST_NAME. An example of the results obtained by running the query is shown below.

LAST_NAME	FIRST_NAME	BIRTH_DATE
OWENS	ELLEN	14/06/1995
HOFFMAN	NANCY	21/11/1975

```
SELECT LAST_NAME, FIRST_NAME, BIRTH_DATE

FROM Employees

WHERE GENDER = "F" AND DEPT_CODE = "SAL"

ORDER BY LAST_NAME DESC;
```

(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 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 Wikipedia is: "https://en.wikipedia.org".

(2) The image is stored in a file called **"AI.png"** and is in the same folder as the html file.

(3) There are three 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:blue;}
    h3 {color:white; background-color:green;}
    table, tr, td {border: 1px solid black;}
    #emphasis {font-weight:bold; color:red;}
    .center {text-align:center;}
    dt {font-style: italic;}
</style>
</head>
```

```
<body>
```

`<!-- "AI Origin" Section -->`

```
<section>

<h2>AI Origin</h2>

<div>

  <img src="AI.png" alt="Artificial

Intelligence">

</div>

<p>

  The term <span id="emphasis">"Artificial

Intelligence" </span>was coined at the 1956

Dartmouth Conference by John McCarthy.

</p>

</section>
```

(5 marks)

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

```
<section>
<h3>What is AI?</h3>
<p class="center">
Broadly Artificial Intelligence (AI) is the
study of intelligence and has been approached
from the following directions:
</p>
<dl>
 <dt>Engineering</dt>
 <dd>Building artifacts that appear to behave
intelligently.</dd>
 <dt>Psychological</dt>
 <dd> Modelling how people are able to behave
intelligently.</dd>
 <dt>Philosophical</dt>
 <dd> Asking what must be true of any entity
that behave intelligently. </dd>
</dl>
</section>
```

(5 marks)

```
<!-- "Risks of AI" Section -->
```

```html
<section>
<h3>Risks of AI</h3>
<p>
The table below shows some of the risks of AI.
</p>
<table>
<tr>
<td>Type of threat</td>
<td>Status of threat</td>
</tr>
<tr>
<td>Unemployment</td>
<td>Already many types of jobs are
disappearing.</td>
</tr>
<tr>
<td>Existential</td><td>None for the near
future.</td>
</tr>
</table>
<p>
To find out more about AI as an existential
threat, go to <a
href="https://en.wikipedia.org">Wikipedia</a>.
</p>
</section>
```

(5 marks)

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

35. LaTeX (15 marks)

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

Note: The image displayed at the end of the first subsection is stored in a file called **Dice.png** and is in the same folder as the LaTeX code. When inserted into the document, the image should be **centred** and **4 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
\section{}	itemize	$
\subsection{}	enumerate	\sqrt{}
\includegraphics{}	verbatim	\frac{}{}
\title{}	flushright	\%
\author{}	center	\ldots
\date{}	quote	\sum_{}^{}
\maketitle	displaymath	\infty
\item	equation	\#
\usepackage{graphicx}	quotation	^
\emph{}		_

```
\documentclass[a4paper]{article}
\usepackage{graphicx}

\begin{document}
\title{Estimating Numbers}
\author{Dr. Math Wikipedia}
\date{Semester 2 2018}
\maketitle
\section{Estimating Probability
Distributions}
\subsection{Estimating Even Sums}
The probability of an event is defined as
the sum of the probabilities of the outcomes
that satisfy the event; e.g., the
probability of ``the dice rolls an even
value" is
$p(2)+p(4)+p(6)=\frac{1}{6}+\frac{1}{6}+\fra
c{1}{6}=\frac{1}{2}$.
\begin{center}
\includegraphics[width=4cm]{Dice.png}
\end{center}
\subsection{Estimating General Sums}
The formula for estimating sums of two dice
```

```
is
\begin{displaymath}
P(S>\#)=\sum _{i=\#+1}^{12}p(i)
\end{displaymath}
\subsection{Examples of Probabilities}
For instance:
\begin{itemize}
\item $P(S>11) = \frac{1}{36} = 2.8\%$
\item $P(S>10) = \frac{1}{18} + \frac{1}{36}
= 8.4\%$
\item $\ldots$
\end{itemize}
```

```
\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