

# THE UNIVERSITY OF AUCKLAND

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**FIRST SEMESTER, 2015**  
**Campus: City**

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## COMPUTER SCIENCE

### An Introduction to Practical Computing

**(Time Allowed: TWO HOURS)**

**NOTE:**

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

**No** calculators are 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.

<b>Surname</b>	
<b>Forenames</b>	
<b>Student ID</b>	
<b>Login (UPI)</b>	

	<b>Question</b>	<b>Mark</b>	<b>Out Of</b>
1 - 25	Multiple Choice		50
26	Programming using Python		10
27	Spreadsheets		10
28	Databases		10
29	LaTeX		10
30	XHTML and CSS		10
	<b>TOTAL</b>		<b>100</b>

**SECTION A****MULTIPLE CHOICE QUESTIONS**

Each question in this section is worth **2 marks**. 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**

[2 marks] What is preventing Moore's Law that "the number of transistors on a single integrated circuit doubles approximately every 18 months" from continuing to hold?

- (a) Chip needs to be too big.
- (b) Chip needs to be too small.
- (c) Chip getting too complicated.
- (d) Chip overheating.

**Question 2**

[2 marks] What is the decimal number 237 in binary?

- (a) 11101101
- (b) 11110101
- (c) 11011101
- (d) 11101110

**Question 3**

[2 marks] How much memory do you need to store 8 bitmap images that are 128 bytes each?

- (a) 8 KiB
- (b) 1 MiB
- (c) 1 KiB
- (d) 1 GiB

**Question 4**

[2 marks] Which of the following statements is TRUE?

- (a) 1 MiB < 1 MB
- (b) 1MiB > 1MB
- (c) 1 MB = 100 KB
- (d) 1MiB = 1 MB

**Question 5**

[2 marks] Which of the following file extensions would an image file NOT have?

- (a) tex
- (b) png
- (c) gif
- (d) svg

**Question 6**

[2 marks] Which of the following statements concerning copyright is FALSE?

- (a) The copyright usually lasts for the life of the author plus 50 or 70 years.
- (b) Copyright is the “right to copy”.
- (c) Europe does not recognize copyright.
- (d) The creator retains the rights to their creations.

**Question 7**

[2 marks] What does the IP protocol do?

- (a) The IP protocol only divides the message into packets.
- (b) The IP protocol divides the message into packets, checks that all packets arrive, and recombines packets to reform the message.
- (c) The IP protocol translates domain names into IP addresses.
- (d) The IP protocol defines addresses for computers on the network and specifies the routing information.

**Question 8**

[2 marks] What does the DNS do?

- (a) It only divides the message into packets.
- (b) It translates domain names into IP addresses.
- (c) It divides the message into packets, checks that all packets arrive, and combines packets to reform the message.
- (d) It defines addresses for computers on the network and specifies the routing information.

**Question 9**

[2 marks] Which of the following statements about the IMAP protocol is TRUE?

- (a) IMAP is the Internet Mail Access Protocol, where email is kept on the server and the email client just shows what messages are on the server and downloads them on demand.
- (b) IMAP is the Internet Mail Access Protocol, where email is downloaded from the server to the local computer and deleted from the server after download.
- (c) IMAP is the Internet Mail Access Protocol, where it contacts the Domain Name System Server to find the address of the mail server and sends the email message to the destination mail server.
- (d) IMAP is the Intelligent Mail Access Protocol, where the server decides which email is SPAM and deletes it before it is delivered.

**Question 10**

[2 marks] Which statement below is FALSE?

- (a) Edward Tufte thinks PowerPoint causes poor presentations and misunderstandings.
- (b) Edward Tufte thinks PowerPoint is OK if you don't use animations.
- (c) Edward Tufte thinks PowerPoint constrains the presenter.
- (d) Edward Tufte thinks the data is forced to fit PowerPoint.

**Question 11**

[2 marks] How much memory is required for a 32 colour bitmap image which is 80 pixels wide and 100 pixels high?

- (a) 40 KiB
- (b) 5 KiB
- (c) 40 KB
- (d) 5 KB

**Question 12**

[2 marks] Which statement about compression algorithms is TRUE?

- (a) JPEG is a good compression algorithm for photographs but not for graphics.
- (b) GIF is a good compression algorithm for photographs but not for graphics.
- (c) PNG is a good compression algorithm for photographs but not for graphics.
- (d) PNG can handle fewer colours than GIF.

**Question 13**

[2 marks] Which of the following statements about Artificial Intelligence is FALSE?

- (a) It will be some time before computers are as intelligent as people.
- (b) Just like with people, some software is more intelligent than others.
- (c) Seeming intelligent and being intelligent are not the same.
- (d) The Turing test is all we need to tell if a computer is intelligent.

**Question 14**

[2 marks] Which of the following statements about Artificial Intelligence is FALSE?

- (a) Some researchers thought that computers would never be intelligent.
- (b) Researchers have agreed on what it means for a computer to be intelligent.
- (c) Some researchers think that for computers to be intelligent they must be massively parallel like the human brain.
- (d) Early researchers thought intelligent computers would have appeared by the year 2,000.

**Question 15**

[2 marks] In 1993 Marc Andreessen created the first GUI Web browser called ...

- (a) Mosaic.
- (b) Netscape.
- (c) Google.
- (d) Internet Explorer.

**Question 16**

[2 marks] A proxy is ...

- (a) a computer which sits between the client and server, and logs illegal processes.
- (b) a computer which sits between the client and server, and intercepts and processes requests.
- (c) software which sits between the client and server, and intercepts and processes requests.
- (d) software which sits between the client and server, and stores information for quick access.

**Question 17**

[2 marks] An advantage of Internet anonymity is that ...

- (a) it allows discussions of sensitive issues.
- (b) it allows people to be irresponsible.
- (c) it allows personal abuse and impersonation.
- (d) it prevents people from speaking out.

**Question 18**

[2 marks] Which of the following is included in the Copyright (New Technologies) Amendment Act 2008 No 27?

- (a) Delay-shifting.
- (b) Transport copying.
- (c) Format-shifting (one copy of music per player).
- (d) Space-shifting (computer memory must be backed up and encrypted).

**Question 19**

[2 marks] PostScript is a ...

- (a) programming language created in 1994.
- (b) Google printing machine.
- (c) Microsoft software application.
- (d) programming language for creating vector graphics.

**Question 20**

[2 marks] What is the ASCII code for the word "Beard"?

- (a) 098 101 097 114 100
- (b) 066 101 097 114 100
- (c) 098 069 065 082 068
- (d) 066 069 065 082 068

**Question 21**

[2 marks] ENIAC was a computer that was built at ...

- (a) Princeton University between the years 1940 – 1946.
- (b) Iowa State College in 1946.
- (c) Caltech in 1944.
- (d) Pennsylvania University between the years 1943 – 1946.

**Question 22**

[2 marks] VisiCalc was the first ...

- (a) spreadsheet computer program.
- (b) computer program created by Microsoft.
- (c) logic programming language.
- (d) version of the program *Mathematica*.

**Question 23**

[2 marks] The world's biggest wiki is ...

- (a) LaTeX-wikia.
- (b) Wikileaks.
- (c) Wiktionary.
- (d) Wikipedia.

**Question 24**

[2 marks] The RSA public-key encryption uses two distinct prime numbers  $p$  and  $q$  as ...

- (a) the private key and their product as the public key.
- (b) the public key and their product as the private key.
- (c) the private key and their sum as the public key.
- (d) the public key and their sum as the private key.

**Question 25**

[2 marks] D-Wave computes at a temperature ...

- (a) below approximately  $-373.1\text{C}$
- (b) of approximately  $-373.1\text{C}$
- (c) below approximately  $-273.1\text{C}$
- (d) of approximately  $-473.1\text{C}$

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## 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.

### 26. Programming Using Python (10 marks)

- (a) Write a Python program that prompts the user for two positive integer numbers. The user may enter numbers which are positive, zero, or negative. If both numbers entered by the user are positive the program should print out the *first number to the power of the second number* (as in Example 1 below), otherwise if at least one of the numbers entered by the user is not a positive number the program should tell the user that they have entered an invalid number (as in Example 2 below).

The following **two examples** show the exact formatting expected for the prompts and output. Your program must produce the same output as shown below, given the example input shown below.

**Example 1:**

```
Enter a positive integer: 2
Enter a second positive integer: 3
2 to the power of 3 is 8
```


**Example 2:**

```
Enter a positive integer: -8
Enter a second positive integer: 3
You have entered a number that is not positive.
```

(4 marks)

(b) Show the output from the following program.

```
count = 2
end = 7
while count < end:
    n = (count - 1) * count // 2
    print(n)
    count = count + 1
```



(3 marks)

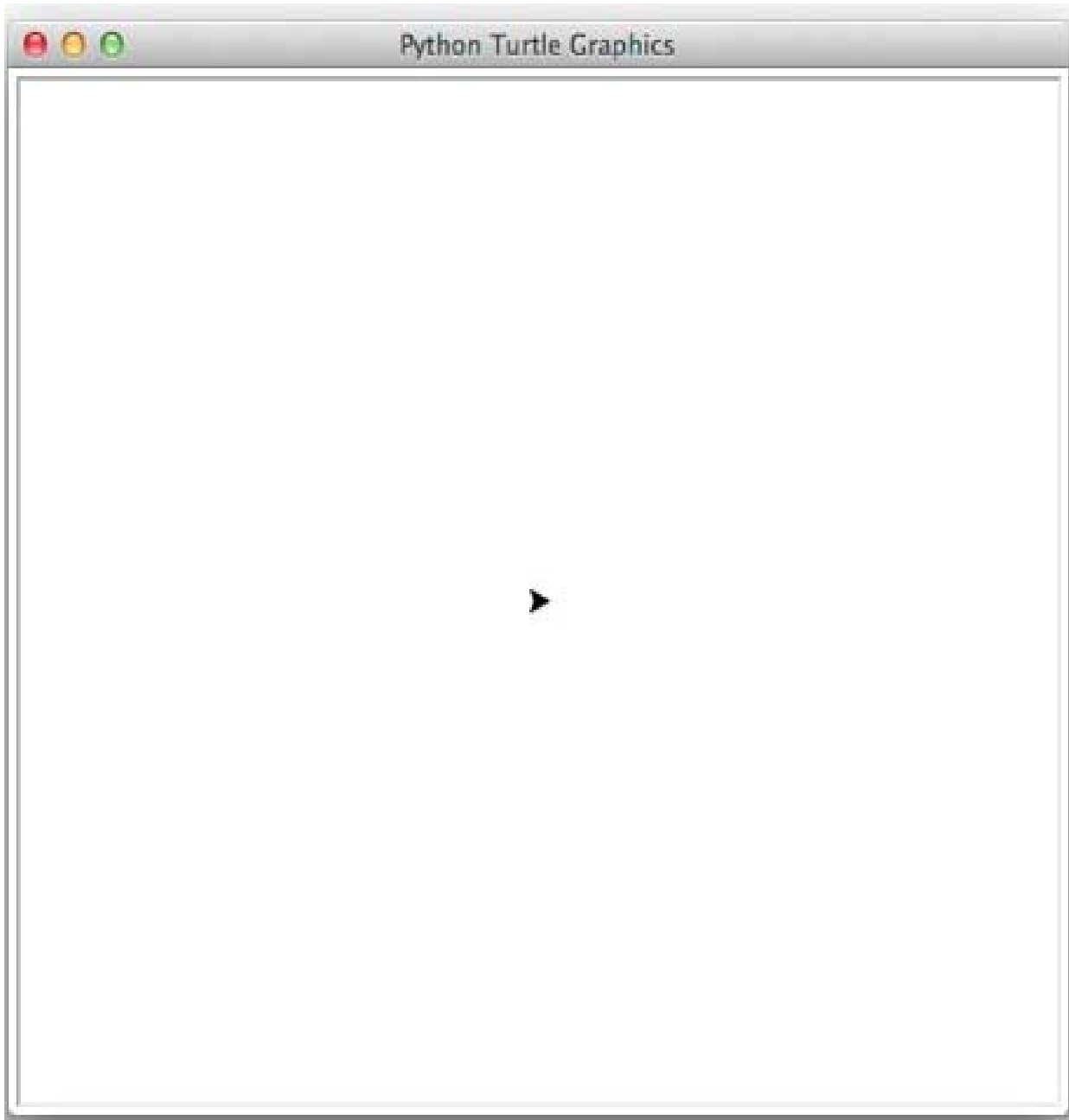
(c) On the following page, draw the output produced by the turtle in the following Python program. Assume that the turtle begins in the middle of the window facing right and that the window is approximately 400 steps wide.

```
import turtle

steps = 50
angle = 90
sides = 8
count = 0

while count < sides:
    if count < 4:
        turtle.forward(steps)
        turtle.left(angle)
    else:
        turtle.forward(steps*2)
        turtle.right(angle)
    count = count + 1
```

CONTINUED



(3 marks)

**27. Spreadsheets (10 marks)**

The following spreadsheet displays a payroll for a restaurant. Different employees have different pay rates depending on their job. Also different people pay different tax rates (either 10% or 20%) depending on how much they have earned for the week and whether they have a 2<sup>nd</sup> job.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	<b>Employee</b>	<b>Position</b>	<b>2nd Job</b>	<b>Mon</b>	<b>Tues</b>	<b>Wed</b>	<b>Thurs</b>	<b>Fri</b>	<b>Total</b>	<b>Rate</b>	<b>Gross Pay</b>	<b>Tax</b>	<b>Net Pay</b>
2	John	Waiter	Yes	0	6	8	4	4	22	8	176	35.2	140.8
3	Susy	Waitress		0	4	4	6	8	22	8	176	17.6	158.4
4	Sam	Cook		10	10	10	10	10	50	10	500	100	400
5	Fred	Bartender		8	8	8	8	8	40	12	480	96	384
6	Katie	Bartender		6	10	6	10	6	38	12	456	91.2	364.8
7	Sally	Hostess	Yes	0	6	6	6	0	18	10	180	36	144
8	Mike	Host		0	6	6	6	0	18	10	180	18	162
9										<b>Total</b>	2148	394.00	1754.00
10										<b>Average</b>	306.86	56.29	250.57
11	<b>Position</b>	<b>Pay Rate</b>											
12	Waiter	8											
13	Waitress	8											
14	Cook	10											
15	Bartender	12											
16	Host	10											
17	Hostess	10											

- (a) Cell K2 calculates the Gross Pay for the employee. What is the best formula to use in Cell K2? Your formula should fill down from K2 to K8 correctly.

(1 mark)

- (b) Cell K10 calculates the average salary for all employees. What is the best formula to use in Cell K10?

(1 mark)

- (c) Cell **J2** displays the employee's hourly pay rate. What is the best formula to use in Cell **J2**? Your answer should use the **VLOOKUP** function to retrieve the appropriate **Pay Rate** from the **Pay Rate Table** in cells **A12:B17**. The VLOOKUP function has the following syntax:

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

**Note:** Your formula should fill down from **J2** to **J8** correctly.

<p><code>= VLOOKUP ( _____ , _____ , _____ , _____ )</code></p>
---

(4 marks)

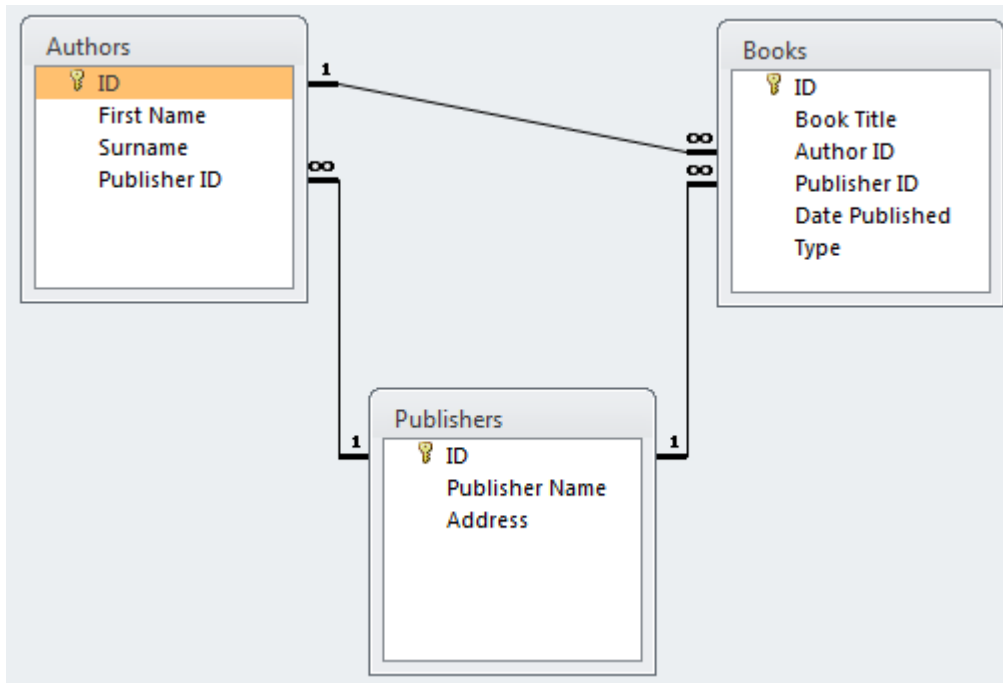
- (d) Cell **L2** calculates the tax amount by multiplying the gross pay by the appropriate tax rate. If the employee has a 2<sup>nd</sup> job or has earned more than \$200 for the week, the tax rate used to calculate the tax amount is **20%** – otherwise the tax rate is **10%**. What is the best formula to use in cell **L2**? Your answer must use an **IF** function.

<p><code>=IF ( _____ _____ _____ )</code></p>
---

(4 marks)

**28. Databases (10 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.

(1 mark)

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

(1 mark)

- (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

<b>Field:</b>				
<b>Table:</b>				
<b>Sort:</b>				
<b>Show:</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Criteria:</b>				
<b>or:</b>				

(4 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

(4 marks)

**29. LaTeX (10 marks)**

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

# Mathematics

## A. Mathematician

### June 2015

## 1 Math Formulas

### 1.1 Sine Approximation

$$\sin(x) = \sum_{n=0}^{\infty} \frac{(-1)^n x^{2n+1}}{2n+1} = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \dots \quad (1)$$

### 1.2 *Surface Area* of a Right Circular Cone

$$A = \pi r \left( r + \sqrt{h^2 + r^2} \right) \quad (2)$$

where

- $r$  is the **radius** and
- $h$  is the **height**.

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>\infty</code>
<code>\subsubsection{}</code>	<code>flushright</code>	<code>\frac{ }{ }</code>
<code>\large</code>	<code>center</code>	<code>\left(</code>
<code>\textbf{}</code>	<code>quote</code>	<code>\right)</code>
<code>\title{}</code>	<code>displaymath</code>	<code>\pi</code>
<code>\author{}</code>	<code>equation</code>	<code>\sum_{ } ^{ }</code>
<code>\date{}</code>	<code>quotation</code>	<code>\cdots</code>
<code>\maketitle</code>		<code>^</code>
<code>\item</code>		<code>-</code>



```
\documentclass[a4paper]{article}
\begin{document}
```

```
\end{document}
```

(10 marks)

CONTINUED

### 30. HTML5 and CSS (10 marks)

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

**ICC Cricket World Cup**

**About the Cricket World Cup**

The Cricket World Cup started in 1975 and is held every 4 years. The next tournament will be in **2019**. For more information, see [Cricket World Cup Wikipedia Page](#).

**Countries with the Most Wins**

1. Australia - 5 Wins
2. India, West Indies - 2 Wins

**Last Two Finals**

Tournament Year	Finals
2015	<i>Australia</i> vs. New Zealand
2011	<i>India</i> vs. Sri Lanka

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 Cricket world Cup wikipedia webpage is:  
"[http://en.wikipedia.org/wiki/Cricket\\_World\\_Cup#Results](http://en.wikipedia.org/wiki/Cricket_World_Cup#Results)".

```
<!DOCTYPE html>
<html>
<head>
<meta charset="UTF-8">
<title>HTML5 Exam Question</title>
<style type="text/css">
h1, h2 { background-color: black; text-align: center;
        font-family:sans-serif; color: white; }
table, tr, td { border: 1px solid black;}
.winner { font-size: large; font-weight: bold; font-style: italic; }
#emphasis { font-size: large; font-weight: bold; }
</style>
</head>
```

<body>

<!-- Main Heading -->

(1 mark)

<!-- "About" Section -->

(3 marks)

<!-- "Countries with the Most Wins" Section -->

(3 marks)

<!-- "Last Two Finals" Section -->

(3 marks)

</body>  
</html>

CONTINUED

**- 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**

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