

THE UNIVERSITY OF AUCKLAND

SECOND SEMESTER, 2015
Campus: City

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.

Surname	<i>Sample</i>
Forename(s)	<i>Answers</i>
Student ID	
Login (UPI)	

Question	Mark	Out Of
1 - 25 Multiple Choice		50
26 Programming using Python		10
27 Spreadsheets		10
28 Databases		10
29 LaTeX		10
30 HTML5 and CSS		10
TOTAL		100

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] Which of the following statements is TRUE?

- (a) Hard drives hold less information than RAM.
- (b) Secondary storage is always provided by magnetic media.
- (c) Secondary storage is quicker to access than RAM.
- (d) RAM is more expensive per MB than hard disk capacity.

Question 2

[2 marks] If a program running on a new computer takes 60 minutes to solve a problem today (2015), approximately how long would it take on a computer that will be purchased new 6 years from today (2021)? Hint: use Moore's Law as taught in lectures.

- (a) 1.85 minutes.
- (b) 3.75 minutes.
- (c) 15 minutes.
- (d) 7.5 minutes.

Question 3

[2 marks] What is the next binary number in the sequence 110, 1000, 1010?

- (a) 1011
- (b) 1001
- (c) 1101
- (d) 1100

Question 4

[2 marks] Given a machine that uses 5 dials that have 10 different states, how many different numbers can we represent?

- (a) 50
- (b) 100,000
- (c) 10,000
- (d) 99,999

Question 5

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

- (a) Freeware is always open-source software.
- (b) Proprietary software is never free.
- (c) Freeware can be modified legally.
- (d) The owners of proprietary software retain the legal rights to that software.

Question 6

[2 marks] Which one of the following is system software?

- (a) Norton Anti-virus
- (b) Microsoft Office
- (c) iTunes
- (d) Notepad++

Question 7

[2 marks] Which of the following statements about the Domain Name System (DNS) is FALSE?

- (a) Each domain name must be registered.
- (b) Domain names consist of individual labels separated by dots.
- (c) The DNS automatically assigns a domain name to an IP address.
- (d) The DNS server translates domain names into IP addresses.

Question 8

[2 marks] Jim is always travelling, and often checks his email on different devices including his home computer, work computer, mobile phone, and his iPad. He needs to be able to access the same emails on all his devices. Which protocol for email retrieval should Jim use to access his emails?

- (a) ICMP
- (b) LDAP
- (c) POP3
- (d) IMAP

Question 9

[2 marks] Which of the following would be used in the Stage One Wiki to add a link to an internal page named CS Department?

- (a) CS Department
- (b) [[CS Department]]
- (c) [CS Department]
- (d) [[[CS Department]]]

Question 10

[2 marks] Which of the following statements is NOT how vandalism is dealt with on Wikipedia?

- (a) Wikipedia has a two-strike approach which means that users will be blocked if they commit vandalism on more than one occasion.
- (b) In most cases, vandalism is automatically detected and reverted by a bot.
- (c) Locking articles so that only established users, or in some cases only administrators, can edit the articles.
- (d) Some editors will monitor recent changes for possible vandalism.

Question 11

[2 marks] Which of the following is used for temporary storage of web documents such as HTML pages and images, to reduce bandwidth usage, server load, and perceived lag?

- (a) A web server.
- (b) A proxy.
- (c) A firewall.
- (d) A cache.

Question 12

[2 marks] Which one of the following statements about browser blocking software is FALSE?

- (a) A white list allows access to a number of websites that are harmful.
- (b) A white list allows access to every website that is on the list.
- (c) A black list may allow access to a number of websites that are harmful.
- (d) A black list may allow access to a number of websites that are harmless.

Question 13

[2 marks] Which of the following scenarios is infringing New Zealand censorship laws?

- (a) An RP13 movie is watched by a 12 year old girl who is accompanied by her mother.
- (b) An M movie is watched by a 12 year old boy who is not accompanied by an adult.
- (c) A G rated movie is watched by a 12 year old girl who is not accompanied by an adult.
- (d) An R13 movie is watched by a 12 year old boy who is accompanied by his father.

Question 14

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

- (a) PostScript is a web-based bibliographic management system.
- (b) PostScript is a programming language for creating vector graphics.
- (c) PostScript is the standard markup language used to create web pages.
- (d) PostScript is a typesetting system that offers programmable desktop publishing features.

Question 15

[2 marks] Which of the following is NOT a text editor?

- (a) GIMP
- (b) Emacs
- (c) Notepad
- (d) vi

Question 16

[2 marks] Which of the following lists contains events in chronological order from earliest to latest?

- (a) Android developed, iOS developed, Windows Phone developed, Firefox OS developed.
- (b) iOS developed, Android developed, Windows Phone developed, Firefox OS developed.
- (c) Firefox OS developed, Android developed, iOS Developed, Windows Phone developed.
- (d) iOS developed, Windows Phone developed, Android developed, Firefox OS developed.

Question 17

[2 marks] What was Gordon Moore known for?

- (a) Co-founding Intel Corporation.
- (b) Co-founding Xerox PARC.
- (c) Developing VisiCalc.
- (d) Developing the BASIC programming language.

Question 18

[2 marks] What are canvas-based presentation systems (e.g. Prezi) best suited to?

- (a) Presentations involving numerous complex transitions.
- (b) Alternating between specifics and context.
- (c) Showing a linear set of slides.
- (d) Presentations involving one or more complicated diagrams.

Question 19

[2 marks] What does an SVG file contain?

- (a) A collection of shapes.
- (b) A collection of coloured dots.
- (c) A collection of algorithms.
- (d) A collection of black and white dots.

Question 20

[2 marks] If we reduce a 24-bit colour image that is 1 megabyte in size to 16 colours, what will be its new size?

- (a) 1/4 of a megabyte.
- (b) 1/16 of a megabyte.
- (c) 2/3 of a megabyte.
- (d) 1/6 of a megabyte.

Question 21

[2 marks] What is a narrative mechanic?

- (a) A narrative mechanic is a game element used to advance the plot of the game.
- (b) A narrative mechanic is a game developer who specializes in emergent narrative.
- (c) A narrative mechanic is a game element used to create story-based challenges.
- (d) A narrative mechanic is a game developer who specializes in embedded narrative.

Question 22

[2 marks] What do game dynamics emerge from?

- (a) The interaction between mechanics and technologies.
- (b) The interaction between players and game artifacts.
- (c) The interaction between game mechanics and narrative mechanics.
- (d) The interaction between embedded narratives and emergent narratives.

Question 23

[2 marks] Which of the following is likely to degrade game balance?

- (a) Mechanic-art misalignment.
- (b) Altering difficulty by scaling weapon damage.
- (c) Ludonarrative dissonance.
- (d) The ability to slow time.

Question 24

[2 marks] Which of the following best describes the philosophical viewpoint put forward by the Chinese room thought experiment?

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

Question 25

[2 marks] Consider the following problem description and its symbolic representation:

A building has a ground floor $G()$ and a top floor $T()$. An elevator goes between these two floors with the action $\uparrow(x)$ representing person x taking the elevator from the ground floor to the top floor, and action $\downarrow(y)$ representing person y taking the elevator from the top floor to the ground floor. The elevator can only carry one person at a time.

With the above scenario in mind, given the problem state $G(a,b)$, $T(c,d)$, what would the state be after the actions $\downarrow(d)$, $\uparrow(b)$?

- (a) $G(a,b,d)$, $T(c)$
- (b) $G(a)$, $T(b,c,d)$
- (c) $G(b,c)$, $T(a,d)$
- (d) $G(a,d)$, $T(b,c)$

THIS PAGE HAS BEEN INTENTIONALLY LEFT BLANK.

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.

26. Programming Using Python (10 marks)

- (a) Write a Python program that prompts the user to enter their name, and then to enter a number between 1 and 20 inclusive (i.e. 1 and 20 are also considered valid input). You can assume that the user will enter an integer for the number.

Your program needs to make sure that the user enters a value that is within the required range. As long as the user enters a value that is not in the required range, your program needs to inform them of their error and prompt them to try again as in the example below. Once the user has entered a valid integer, inform them that they have done so.

The following **example** shows 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:

```
Please enter your name: Damir
```

```
Please enter a number between 1 and 20 (inclusive): 0  
Damir you have entered an incorrect value!
```

```
Please enter a number between 1 and 20 (inclusive): 21  
Damir you have entered an incorrect value!
```

```
Please enter a number between 1 and 20 (inclusive): 7  
Damir you have entered a 7 well done!
```

```
name = input("Please enter your name: ")  
  
print()  
  
number = int(input("Please enter a number between 1  
                    and 20 (inclusive): "))  
  
while number < 1 or number > 20:  
    print(name, "you have entered an incorrect value!")  
    print()  
    number = int(input("Please enter a number between 1  
                        and 20 (inclusive): "))  
  
print(name, "you have entered a", number,  
      "well done!")
```

(4 marks)

(b) Show the output from the following program.

```
currentValue = 1
count = 1
end = 6
while count < end:
    print(currentValue)
    count = count + 1
    currentValue = currentValue + count
print("Done!")
```

1
3
6
10
15
Done!

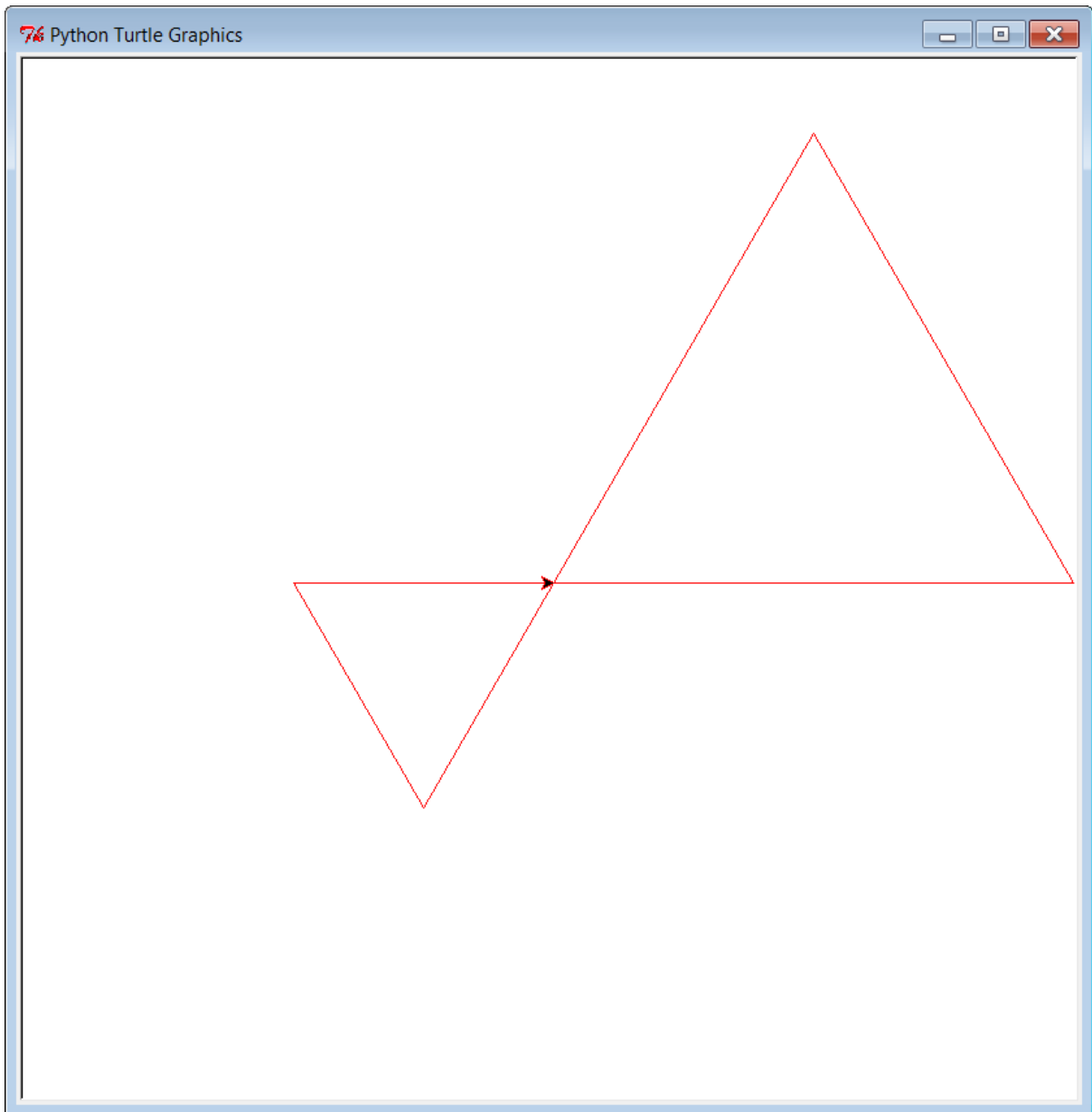
(3 marks)

(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:
    if count < 3:
        turtle.forward(steps)
        turtle.left(angle)
    else:
        turtle.right(angle)
        turtle.forward(steps*0.5)
    count = count + 1
```



(3 marks)

27. Spreadsheets (10 marks)

Body Mass Index (BMI) is a simple index of weight-for-height that is commonly used to classify underweight, overweight and obesity in adults. It is defined as the weight in kilograms divided by the square of the height in metres (kg / m²). The following spreadsheet displays an analysis of the Body Mass Indexes of a group of people.

	A	B	C	D	E
1	Body Mass Index (BMI) Analysis				
2					
3		BMI Table		Count	
4		0	Underweight	1	
5		18.5	Healthy weight	3	
6		25	Overweight	2	
7		30	Obese	1	
8					
9	Name	Weight	Height	BMI	Interpretation
10	Ann	64.5	1.63	24.3	Healthy weight
11	Ross	71.3	1.66	25.9	Overweight
12	George	100.1	1.62	38.1	Obese
13	Gertrude	52.7	1.77	16.8	Underweight
14	Penelope	85.6	1.81	26.1	Overweight
15	Robert	65.8	1.74	21.7	Healthy weight
16	Jane	58.6	1.68	20.8	Healthy weight
17					
18	Mean:	71.23	1.70	24.81	

- (a) Cell **B18** calculates the average (mean) weight of the group of people. What is the best formula to use in Cell **B18**?

= **AVERAGE(B10:B16)**
 = **AVERAGE(\$B\$10:\$B\$16)**
 = **SUM(B10:B16) / 7**
 = **SUM(\$B\$10:\$B\$16) / 7**

(1 mark)

- (b) Cell **D10** calculates the BMI for Ann. A person's BMI is calculated by dividing their weight by the square of their height, i.e. $\text{weight} \div \text{height}^2$. What is the best formula to use in Cell **D10**? Your formula must be able to be filled down from **D10** to **D16**.

```
= B10 / (C10 * C10)
= B10 / C10 ^ 2
= B10 / POWER(C10, 2)
```

(2 marks)

- (c) Cell **E10** displays the interpretation of Ann's BMI. What is the best formula to use in Cell **E10**? Your answer must use the **VLOOKUP** function to retrieve the appropriate interpretation from the **BMI Table** in cells **B4:C7**. The VLOOKUP function has the following syntax:

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

Note: Your formula should fill down from **E10** to **E16** correctly.

```
= VLOOKUP(D10, $B$4:$C$7, 2, TRUE)
```

(4 marks)

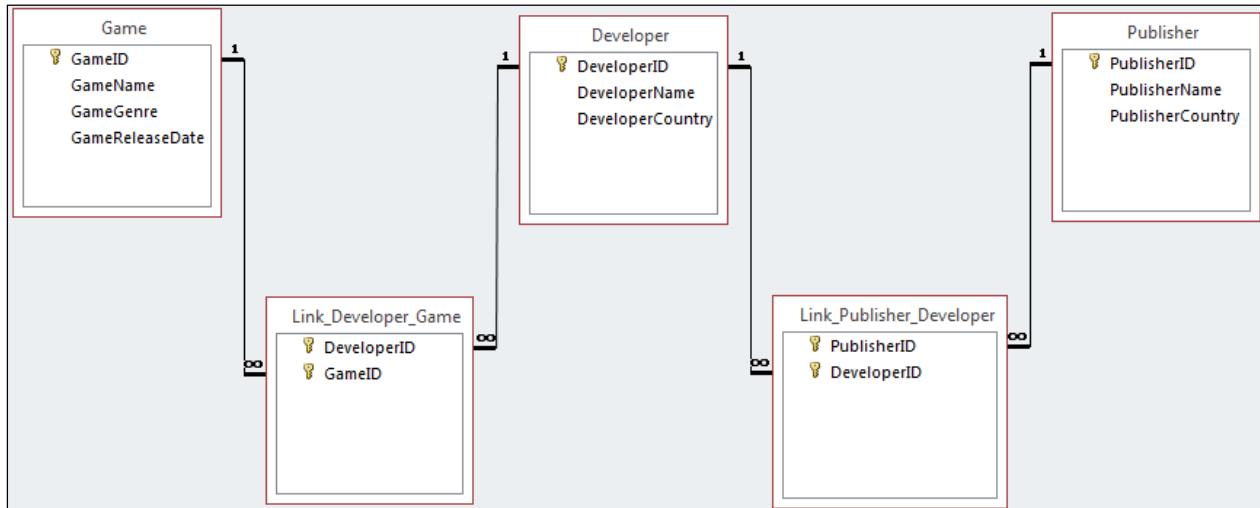
- (d) Cell **D4** uses the **COUNTIF** function to display the number of people who have been classified as "Underweight". What is the best formula to use in cell **D4** so that your formula can be filled down from **D4** to **D7**?

```
=COUNTIF($E$10:$E$16, C4)
```

(3 marks)

28. Databases (10 marks)

Use the following Microsoft Access relationship diagram to answer the questions in this section.



(a) State the primary key field(s) in the **Link_Developer_Game** table.

DeveloperID and GameID

(1 mark)

(b) State the foreign key field(s) in the **Link_Publisher_Developer** table (if any).

Publisher ID

DeveloperID

(1 mark)

(c) What is the appropriate **data type** for the **GameReleaseDate** field in the **Game** table?

Date/Time

(1 mark)

- (d) Complete the query by example (QBE) form below so that it generates a query that displays the **name of the game**, **developer**, and **publisher**, where the publisher is based in the “USA”. The results are to be sorted in **ascending order** based on the **name of the game**. Some example results from the query might be:

GameName	DeveloperName	PublisherName
Destiny	Bungie	Activision Blizzard
Forza Motorsport 6	Turn 10 Studios	Microsoft

Field:	GameName	DeveloperName	PublisherName	PublisherCountry
Table:	Game	Developer	Publisher	Publisher
Sort:	Ascending			
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Criteria:				"USA"

(3 marks)

- (e) Write an SQL query that displays the **name of the game** and **date released** of all games whose **genre** is “RPG”. The results should be sorted in **descending order** based on **release date**. Some example results from the query might be:

GameName	GameReleaseDate
Xenoblade Chronicles X	29/04/2015
Dragon Age: Inquisition	18/10/2014

```

SELECT GameName, GameReleaseDate
FROM Game
WHERE GameGenre = "RPG"
ORDER BY GameReleaseDate DESC;
    
```

(4 marks)

29. LaTeX (10 marks)

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

The Fibonacci Sequence

Leonardo Filius Bonacci

November 1241

1 Introduction

Rabbit populations can be described by the following recursive sequence:

- $a_0 = 0$
- $a_1 = 1$
- $a_{n+2} = a_n + a_{n+1}$ for each $n \geq 0$.

2 An explicit expression

$$a_n = \left(\frac{1 + \sqrt{5}}{2} \right)^n - \left(\frac{1 - \sqrt{5}}{2} \right)^n. \quad (1)$$

The number $\frac{1 + \sqrt{5}}{2} = 1.61803\dots$ is called the **golden ratio**.

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>\geq</code>
<code>\author{}</code>	<code>equation</code>	<code>\sum_{ } ^{ }</code>
<code>\date{}</code>	<code>quotation</code>	<code>\ldots</code>
<code>\maketitle</code>		<code>^</code>
<code>\item</code>		<code>-</code>


```
\documentclass[a4paper]{article}

\begin{document}

\title{The Fibonacci Sequence}
\author{Leonardo Filius Bonacci}
\date{November 1241}
\maketitle

\section{Introduction}

\emph{Rabbit populations} can be described by the following recursive sequence:

\begin{itemize}
\item  $a_0 = 0$ 
\item  $a_1 = 1$ 
\item  $a_{n+2} = a_n + a_{n+1}$  for each  $n \geq 0$ .
\end{itemize}

\section{An explicit expression}

\begin{equation}
a_n = \left( \frac{1 + \sqrt{5}}{2} \right)^n - \left( \frac{1 - \sqrt{5}}{2} \right)^n.
\end{equation}

The number  $\frac{1 + \sqrt{5}}{2} = 1.61803 \dots$  is called the golden ratio.

\end{document}
```

(10 marks)

30. HTML5 and CSS (10 marks)

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

National parks of South Africa

South Africa has a large number of national parks. The *most famous* is [Kruger National Park](#), with an area of 19,485 square km.

The two oldest national parks in South Africa

<i>Park</i>	<i>Year founded</i>
Kruger National Park	1926
Bontebok National Park	1931

List of the most dangerous animals

If you see any of these and you are not in your vehicle, **Run!**

- Lion
- Cheetah
- Hippopotamus

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 Kruger National Park webpage is:
"http://www.sanparks.org/parks/kruger/".

```
<!DOCTYPE html>
<html>
<head>
<meta charset="UTF-8">
<title>HTML5 Exam Question</title>
<style type="text/css">
h1, h2 { background-color: #000000; text-align: center;
        font-family:sans-serif; color: #FFFFFF; }
table, tr, td { border: 1px solid black;}
#tableheader { font-size: large; font-weight: bold; font-style: italic; }
.emphasis { font-size: large; font-weight: bold; }
#sloping { font-style: italic; }
</style>
</head>
```

<body>

<!-- Main Heading -->

```
<h1>National parks of South Africa</h1>
```

(1 mark)

<!-- Introductory Paragraph -->

```
<p>  
South Africa has a large number of national parks.  
The <span id="sloping"> most famous </span> is  
<a href = "http://www.sanparks.org/parks/kruger/">  
Kruger National Park</a>, with an area of 19,485  
square km.  
</p>
```

(2 marks)

<!-- Oldest National Parks Section -->

```
<section>  
  
<h2>The two oldest national parks in South Africa  
</h2>  
  
<table>  
  <tr id = "tableheader">  
    <td>Park</td>  
    <td>Year founded</td>  
  </tr>  
  <tr>  
    <td>Kruger National Park</td>  
    <td>1926</td>  
  </tr>  
  <tr>  
    <td>Bontebok National Park</td>  
    <td>1931</td>  
  </tr>  
</table>  
  
</section>
```

(3 marks)

```
<!-- "Most Dangerous Animals" Section -->
```

```
<section>

<h2> List of the most dangerous animals</h2>

<p>
If you see any of these and you are not in your
vehicle, <span class="emphasis"> Run!</span>
</p>

<ul>
  <li>Lion</li>
  <li>Cheetah</li>
  <li>Hippopotamus</li>
</ul>

</section>
```

(4 marks)

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

- 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