# **University of Cape Town Department of Computer Science**

## **Computer Science CSC1010H**

## Class Test 2

## Wednesday, 20 August 2014

Marks: 35				<ul> <li>Approximate marks per question are shown in brackets</li> </ul>			
Time: 40 minutes  • The use of calculations are the control of the					rmitted		
	Surname						Initials
NAME: Mtsheni Edward						ES.	
STUDENT NO: MTSEDWOY COURSE CODE: CSC 1 5101					>10H		
This paper consists of 6 questions and 6 pages (including this cover page).							
			Mark	Allocation			
Question	Marks	Internal	External	Question	Marks	Internal	External
1	5			5	4		
2	7			6	6		
3	6						
4	7						
Total Total							
	Grand Total						
				F	inal Mark		1
Internal Examiner:			External Examiner:				

### Question 1. [5 marks]

Consider the following problem. Answer it appropriately.

The Petersens have recently moved to a new town and are arranging a surprise birthday party for their son Andre, and have invited three families from the neighbourhood, the Smiths, the Januarys and the Hectors. They plan to make up party packets for the kids to take home after the party, blue for boys and pink for girls.

Being super organised, Mrs Petersen with the help of Mr Petersen wants to determine how many of each colour party packet she needs to buy, and also how many of each colour she needs to put aside for each family.

1

They sit down and come up with the following information. Mrs Petersen remembers that the Hectors have a "pigeon pair", i.e. a boy and a girl. Mr Petersen recalls that the Januarys only have a set of identical twin boys. Mrs Petersen notes that she's only ever noticed two girls from these local families to come over to play. Mr Petersen notes that the Smiths have three children, since the family fits nicely into their family sedan when they go out.

You happen to be visiting the Petersens at this point, and want to impress them with the problem solving skills you've learnt at university. Using the information they've provided, determine how many of each colour party packet they need to buy and how many of each colour they need to allocate to each family and what the total number of party packets are.

Use a diagram to show how you solve the problem.

	Boys	Gitls
	Blue	Pink
Smiths	2	1
Januarys	2	Ø
Januarys Hectors		l

The Hectors have a boy and a girl, meaning
I blue & I pink party packets. The Januarys have
z twin boys, meaning z blue packets. Since there
are z girls from these families, this means that the
Smiths have a daugher & z boys. 5 blue and z
pink packets must be bought, with z blue & [5]
I pink going to the Smiths, 2 blue going to
the Januarys & Ibbue 2 and I pink going to the
Hectors

## Question 2. [7 marks]

Answer the following questions:

a) When using debugging features in an IDE, what should the user typically do one execution has reached the breakpoint?	e
The user should step over the code, do use	
input output and watch how variables cha	<u>nge</u>
in the stack window	[2]
b) When a new module has been defined, how do you ensure that it is accessible and imported into a program with no problems, i.e. "import newmodule" works?	l can be
By saving it in the Python/Lib Directory	[1]
c) Explain what happens in memory when Python makes successive recursive functi	on calls.
runitime stack overflow occurs, meaning	
insufficient memory	[1]
Indicate whether the following statements are True or False.	
d) The accepted Python coding convention for module names is long descriptive nar uppercase.	nes in
False	[1]
e) Curly brackets {} are used to enclose parameters to a function.	
false	[1]
f) The print() function can be used to write to a file.	
True	[1]

### Question 3. [6 marks]

Write a Python function called draw\_line() which draws a horizontal line of characters. The draw\_line() function should take two parameters, with the first being the size of the line (i.e. the number of characters) and the second parameter being the character with which to draw the line. This character parameter should have a default value of an asterisk ('\*').

Calling the draw\_line() function with the following parameters should produce the corresponding output:

```
draw_line(5)
draw_line(6,'$')

def draw_line (size, character):

inty_size=int(size)

f (haracter == "";

print ("{}", format ("*"*size)

print ("{}", format (character *size)

draw_line (4, "#")

[6]
```

### Question 4. [7 marks]

Consider the following recursive function definition:

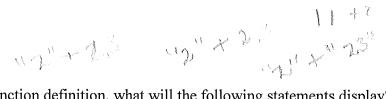
```
def do_this(stuff):
    if len(stuff) == 0:
        return ""
    else:
        return str(stuff[0] * 2) + do_this(stuff[1:])
```

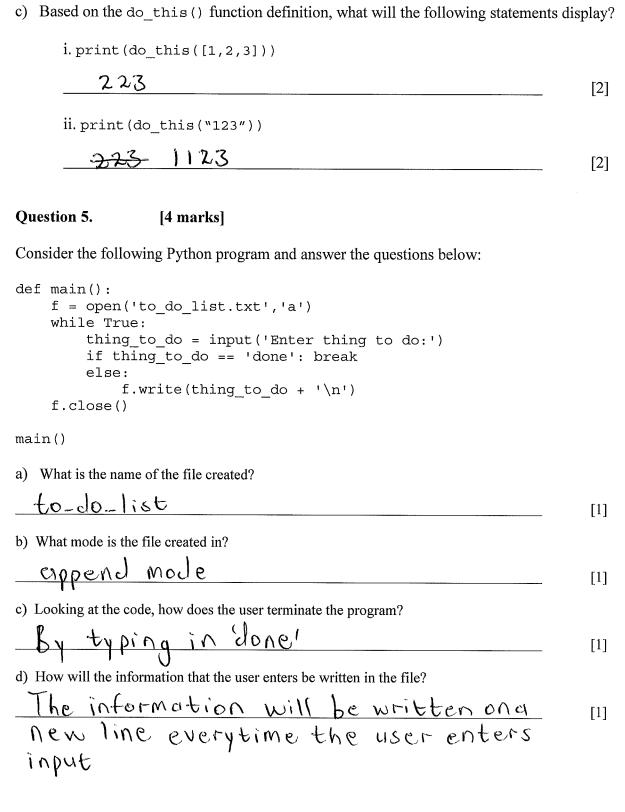
a) What datatype can the parameter to this function be?

b) What is the base case for this function?

If the length of the string is zero, it'll return [1]

an empty space, which is the base case





#### Question 6. [6 marks]

Consider the following definition of the classify weight() function. Specify test cases which thoroughly test the function, using equivalence classes and boundary value. For each test case specify whether it is an equivalence class value or a boundary value.

```
# classifies weight in kgs
      def classify weight (w):
         if 0 < w <= 60:
            return "light"
         elif 60 < w <= 120:
            return "heavy"
         else:
            return "error"
- Equivalence classes
            category values: 20,109
            erroneous values: -1,0
- Boundary values
        * on boundary: 60,120
        * below boundary: -1, -7
*above boundary: 122,170
```

[6]

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### Question 1. [5 marks]

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The Petersens have recently moved to a new town and are arranging a surprise birthday party for their son Andre, and have invited three families from the neighbourhood, the Smiths, the Januarys and the Hectors. They plan to make up party packets for the kids to take home after the party, blue for boys and pink for girls.

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They sit down and come up with the following information. Mrs Petersen remembers that the Hectors have a "pigeon pair", i.e. a boy and a girl. Mr Petersen recalls that the Januarys only have a set of identical twin boys. Mrs Petersen notes that she's only ever noticed two girls from these local families to come over to play. Mr Petersen notes that the Smiths have three children, since the family fits nicely into their family sedan when they go out.

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Use a diagram to show how you solve the problem.

[5]

	Smiths	Januaries	Hectors	
Blue/boys	<u>2</u>	2	1	<u>5</u>
Pink/girls	<u>1</u>	0	1	2
	3	2	<u>2</u>	<u>7</u>

<sup># 1</sup> for grid

<sup># 1</sup> for headings/labels

<sup>#0.5\*6=3</sup> for given values

<sup>#0.5\*6=3</sup> for derived values {end}

## Question 2. [7 marks]

Answer the following questions:

a) When using debugging features in an IDE, what should the u execution has reached the breakpoint?	user typically do once [2]
Step over each line in program #1	
Watches variables #1 {end	<u>i}</u>
b) When a new module has been defined, how do you ensure that imported into a program with no problems, i.e. "import newmod	
Save it in same file #1 or Save it in Python\Lib director	y #1 {end}
c) Explain what happens in memory when Python makes succes [1]	sive recursive function calls.
Each function call/copy is placed on runtime/memory sta	ack #1 {end}
Indicate whether the following statements are True or False.	
d) The accepted Python coding convention for module names is uppercase.	long descriptive names in [1]
false	{end}_
e) Curly brackets {} are used to enclose parameters to a function	n. [1]
false	{end}
f) The print() function can be used to write to a file.	[1]
true	{end}

### Question 3. [6 marks]

Write a Python function called draw\_line() which draws a line of horizontal line of characters. The draw\_line() function should take two parameters, with the first being the size of the line (i.e. the number of characters) and the second parameter being the character with which to draw the line. This character parameter should have a default value of an asterisk ('\*').

Calling the draw\_line() function with the following parameters should produce the corresponding output:

#### Question 4. [7 marks]

Consider the following recursive function definition:

```
def do_this(stuff):
    if len(stuff) == 0:
        return ""
    else:
        return str(stuff[0] * 2) + do this(stuff[1:])
```

a) What datatype can the parameter to this function be?

[2]

List, string #2

Or sequence #2

What is the base case for this function?

[2]

Empty list/string/sequence #1 {end}

c) Based on the do this () function definition, what will the following statements display? i.print(do this([1,2,3]))[2] 246 #2 {end} ii. print(do this("123")) [2] {end} 112233 #2 Question 5. [4 marks] Consider the following Python program and answer the questions below: def main(): f = open('to do list.txt','a') while True: thing to do = input('Enter thing to do:') if thing to do == 'done': break f.write(thing to do  $+ '\n'$ ) f.close() main() a) What is the name of the file created? [1] To do list.txt {end} b) What mode is the file created in? [1] append {end} c) Looking at the code, how does the user terminate the program? [1] Entering done {end} d) How will the information that the user enters be written in the file? [1] Each thing on a new line {end}

### Question 6. [6 marks]

Consider the following definition of the *classify\_weight()* function. Specify test cases which thoroughly test the function, using equivalence classes and boundary value. For each test case specify whether it is an equivalence class value or a boundary value.

```
# classifies weight in kgs
def classify_weight(w):
    if 0 < w <= 60:
        return "light"
    elif 60 < w <= 120:
        return "heavy"
    else:
        return "error"</pre>
```

[6]

any value between 0 and 60 – equivalence class value #1 any value between 60 and 120 – equivalence class value #1 any value not between 0 and 120 – equivalence class value #1 0 – boundary value #1 60 – boundary value #1 120 – boundary value #1

{end}