STUDENT NO:	
SURNAME:	
INITIALS:	

University of Cape Town

Department of Computer Science

Computer Science CSC1010H

June Test

Monday, 5 June 2014

Marks: 100	• Approximate marks per question are shown in brackets
Time: 3 hours	• The use of calculators is permitted

This paper consists of 8 questions and 10 pages (including this cover page).

Mark Allocation							
Question	**Marks**	**Internal**	**External**	**Question**	**Marks**	**Internal**	**External**
1	12			6	15		
2	11			7	12		
3	10			8	4		
4	10			9			
5	6			10			
	Total				**Total**		
					Grand Total		
					Final Mark		
Internal Examiner:				**External Examiner:**			

Question 1. **[12 marks]**

For all the statements below, give the output:

a) `print(24 - 3 * (4 + 8) / 2)` — 6 [1]

b)
```
b = 5
b **= 2
print(b)
```
— 25 [1]

c) `print(6//4/2)` — 0.5 [1]

d)
```
i, j, k = 5, 7, 3
print((i > j) or not(j < k))
```
— True [1]

e)
```
s = [2,3,6,8,5,4,1]
print(s[3:5])
```
— [8, 5] [1]

f) `print({3:'a',2:'b',1:'c',0:'d'}[1])` — c [1]

i)
```
p = 24
for q in range(6,0,-2):
    print(p//q)
```
— 4
— 6
— 12 [3]

j)
```
s, t = 12, 2
while s > t:
    print(s%t)
    s -= 2
    t += 2
```
— 0
— 2
— 2 [3]

Question 2. **[11 marks]**

Answer the following questions:

a) Name an example of a popular operating system used today.

windows [1]

b) Name the low-level programming language made up of 0s and 1s.

machine language/code [1]

c) Which standard Python module is used to import common mathematical functions?

math [1]

d) Which function is used to determine the length of a sequence?

len [1]

Insert the missing word:

e) The float Python data type stores numbers with fractional decimal values. [1]

f) The Python compiler typically reports on syntax errors. [1]

Indicate whether the following statements are True or False:

g) In Python it is possible to concatenate a string with an integer.

false [1]

h) In Python the standard number of spaces for indentation is 5 spaces.

false [1]

i) It is possible to change the elements of a Python tuple.

false [1]

j) When an arithmetic operation is performed a float and an int Python returns an int.

false [1]

k) An elif statement, which forms part of an if statement, always needs a condition specified.

true [1]

Question 3. **[10 marks]**

Consider the following Python program with line numbers and answer the questions below.

```
1.    def main():
2.        a = [12,6,34,21,9,25,16]
3.        b = (25,12,9,36)
4.        s = 0
5.        for i in a:
6.            if i in b:
7.                s += i
8.            else:
9.                print(str(i))
10.       print(str(s))
11.
12.   main()
```

a) What data type is the variable `a` on line 2? list [1]

b) What data type is the variable `b` on line 3? tuple [1]

c) Explain in your own words what this program does.

It sums up all the numbers from list a which are also in tuple b.

It prints out all the numbers from list a which are not in tuple b.

It prints out the sum. [3]

d) What will the output of this program be?

6
34
21
16
46

[5]

Question 4. **[10 marks]**

Complete the program below. Prompt the user to enter a string. Calculate how many lowercase and how many uppercase characters are in the entered string, ignoring any other characters. Print out the number of lowercase and uppercase characters.

Here is an example of what the program should look like when it is run:

```
Enter string: Hello Thandi, welcome to Cape Town.
Lowercase characters: 24
Uppercase characters: 4
```

Hint: You may use the string methods which are described on the next page.

```
def main():

    s = input('Enter string:') #1
    ucount = 0 #1
    lcount = 0 #1
    for c in s: #1
        if c.isupper(): #1
            ucount += 1 #1
        if c.islower(): #1
            lcount += 1 #1
    print('Lower case:',lcount) #1
    print('Upper case:',ucount) #1
```

[10]

```
main()
```

Some of the Standard Python Methods for Strings

```
| isalpha(...)
|     S.isalpha() -> bool
|
|     Return True if all characters in S are alphabetic
|     and there is at least one character in S, False otherwise.
|
| islower(...)
|     S.islower() -> bool
|
|     Return True if all cased characters in S are lowercase and there is
|     at least one cased character in S, False otherwise.
|
| isnumeric(...)
|     S.isnumeric() -> bool
|
|     Return True if there are only numeric characters in S,
|     False otherwise.
|
| isspace(...)
|     S.isspace() -> bool
|
|     Return True if all characters in S are whitespace
|     and there is at least one character in S, False otherwise.
|
| isupper(...)
|     S.isupper() -> bool
|
|     Return True if all cased characters in S are uppercase and there is
|     at least one cased character in S, False otherwise.
|
| lower(...)
|     S.lower() -> str
|
|     Return a copy of the string S converted to lowercase.
|
| swapcase(...)
|     S.swapcase() -> str
|
|     Return a copy of S with uppercase characters converted to lowercase
|     and vice versa.
|
| upper(...)
|     S.upper() -> str
|
|     Return a copy of S converted to uppercase.
```

Question 5. **[6 marks]**

Find three errors in the Python code fragment below which would be generated by the Python compiler, indicating which line number it is on, as shown on the left. Also indicate what the error is, and explain how you would fix it:

```
1.    sum, count = 0, 0
2.    while(true):
3.        num = int(input('enter number(zero to end):'))
4.        if num == 0
5.            break
6.        sum += num
7.        count += 1
8.
9.    average = sum/count
10.   print('Average is ' + average)
```

On line 2 true in lowercase. Should be True. #2

On line 4 no terminating :. Add : #2

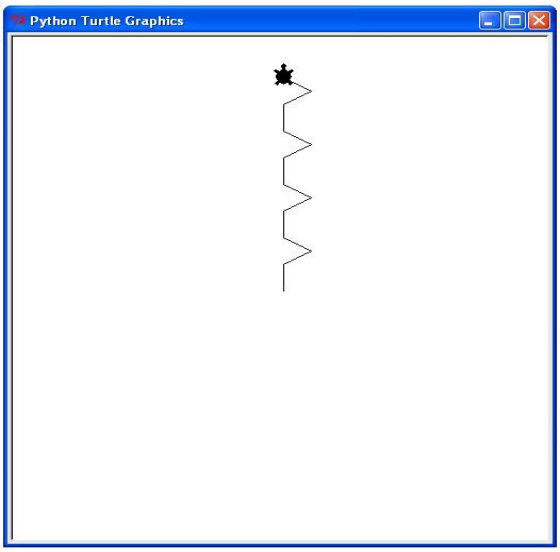
On line 10 average is a float. Add str(average). #2

---

[6]

Question 6. **[15 marks]**

Write a complete Python Turtle program which draws the exact pattern below. Use the turtle graphics functions to let the user enter the size of the lines as well as the colour of the lines. Also ensure the turtle window closes properly. Note: the smallest angle between each two adjacent lines is 60 degrees.



```
import turtle

def main():

    size = turtle.numinput("Size","size:")
    clr = turtle.textinput("Clr","clr:")
    turtle.pencolor(clr)
    for i in range(4):
        turtle.fd(size)
        turtle.rt(60)
        turtle.fd(size)
        turtle.lt(120)
        turtle.fd(size)
        turtle.rt(60)

    turtle.exitonclick()

main()

# 1 for every line, +1 for changing all sizes
```

---

[15]

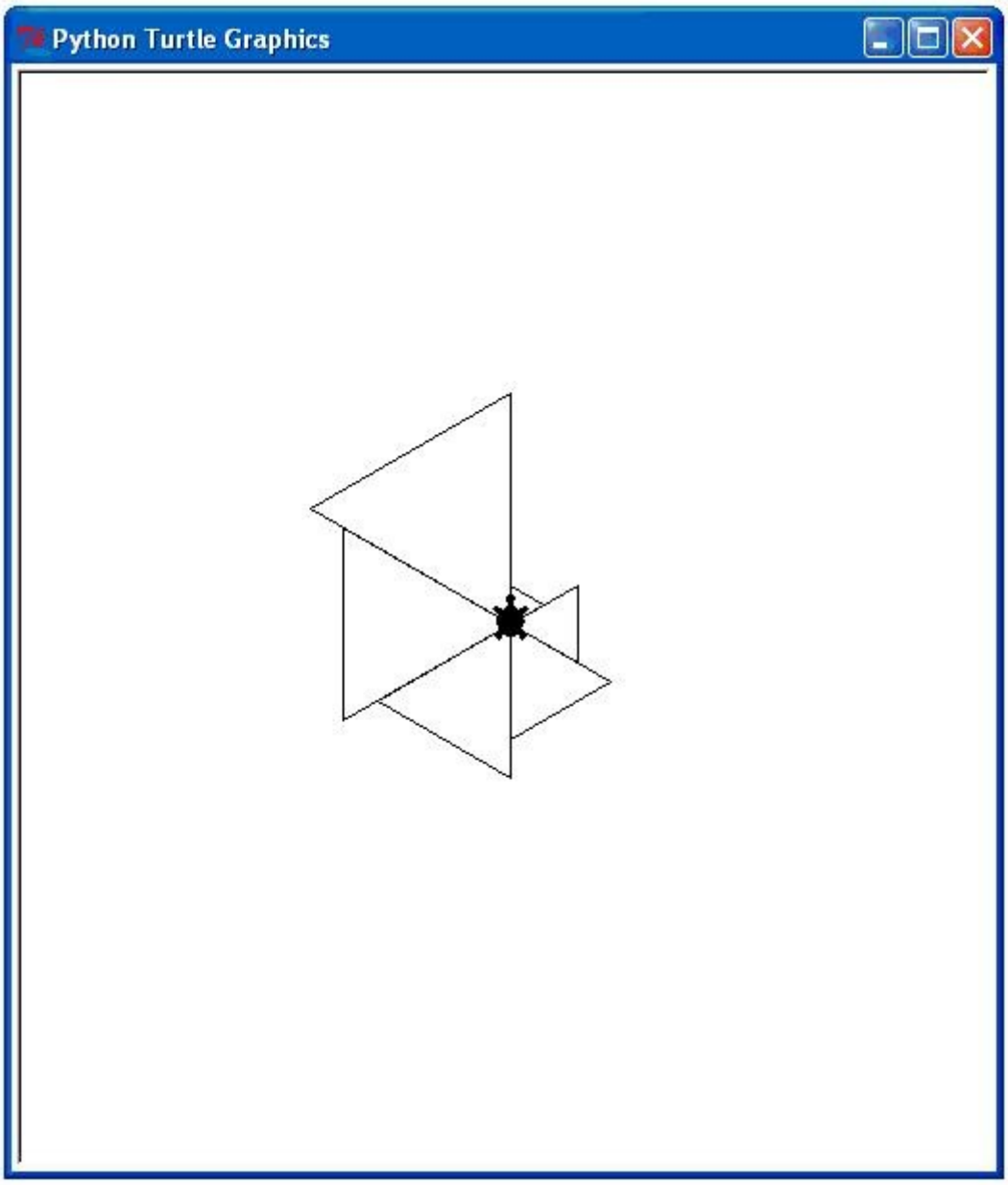
Question 7. **[12 marks]**

Draw the output of the following program in the Turtle Graphics window provided below.

```
import turtle

def main():
    for size in range(20,140,20):
        for j in range(3):
            turtle.forward(size)
            turtle.right(120)
        turtle.right(60)
    turtle.exitonclick()

main()
```



2 for every triangle [12]

Question 8. **[4 marks]**

Consider the Python program below and answer the questions which follow:

```
import math

def main():
    print('*** Cylinder Calculator ***')
    val1 = int(input('Enter radius:'))
    val2 = int(input('Enter height:'))
    val3 = math.PI * val1 ** 2 * val2
    val4 = (2 * math.PI * val1 * val2) + (2 * math.PI * val1 ** 2)
    print('Cylinder volume is', val3)
    print('Cylinder surface area is', val4)

main()
```

Provide better, more descriptive names for the following identifiers, based on accepted Python coding conventions:

a) val1 _____radius_____ [1]

b) val2 _____height_____ [1]

c) val3 _____volume_____ [1]

d) val4 _____surface_area_____ [1]