COME103 / CENG111 Computer Programming I

Lab - 6

21 November 2019

1. TRUE / FALSE QUESTIONS

_____Python function names follow the same rules as those for naming variables.

_____A hierarchy chart shows all the steps that are taken inside a function.

_____A local variable can be accessed from anywhere in the program.

_____Different functions can have local variables with the same names.

_____To assign a value to a global variable in a function, the global variable must be first declared in the function.

_____A value-returning function is like a simple function except that when it finishes it returns a value back to the part of the program that called it.

_____In Python, you cannot write functions that accept multiple arguments.

_____Some library functions are built into the Python interpreter.

_____Complex mathematical expressions can sometimes be simplified by breaking out part of the expression and putting it in a function.

2. COMPLETION QUESTIONS: Fill in the blanks.

a) The function header begins with the keyword _____ and is followed by the name of the function.

b) The top-down design breaks down the overall task of a program into a series of _____.

c) A(n) _____ chart is a visual representation of the relationships between functions.

d) A variable is accessible only to statements in the variable's _____.

e) To refer to/use a function in a module, Python uses _____ notation.

3. ALGORITHM WORKBENCH QUESTIONS

a) What will the following program display?

```
def main():
    x = 1
    y = 3.4
    print(x, y)
    change_us(x, y)
    print(x, y)
def change_us(a, b):
    a = 12.1
    b = 5.5
    print(a, b)
main()
```

b) Write a function named `square` that receives one parameter (side of square in pixels) from the caller then it draws a square of desired size by using turtle graphics.

MULTIPLE CHOICE QUESTIONS

4. The first line in a function definition is known as the function_____.
a) header
b) block
c) return
d) parameter

5. The _____ design technique can be used to break down an algorithm into functions.
a) subtask
b) block
c) top-down
d) simplification

6. A(n) _____ chart is also known as a structured chart.
a) flow
b) data
c) hierarchy
d) organizational

7. The _____ of a local variable is the function in which that variable is created.
a) global reach
b) definition
c) space
d) scope

8. A(n) _____ is any piece of data that is passed into a function when the function is called.
a) global variable
b) argument
c) local variable
d) parameter

9. A(n) _____ is a variable that receives an argument that is passed into a function.
a) global variable
b) argument
c) named constant
d) parameter

10. A _____ variable is accessible to all the functions in a program file.

a) Keyword
b) Local
c) Global
d) String

11. It is recommended that programmers avoid using _____ variables in a program whenever possible.

a) local
b) global
c) string
d) keyword

PROGRAMS

12. Python allows you to repeat a string by multiplying it by an integer, e.g. 'Hi' * 3 will give 'HiHiHi'. Pretend that this feature does not exist, and instead write a function named repeat that accepts a string and an integer as arguments. The function should display a string of the original string repeated the specified number of times, e.g. `repeat('Hi', 3 )` should display 'HiHiHi'. Write a program that test/uses the repeat function. In your program the string and how many times of repetition is taken from user in the `main` then the main program calls `repeat` function to print the string as desired number of times.

Example terminal output of the program is the followings where HKU is entered as string and 7 times inputted:

```
Enter a string:HKU
How many times?7
HKUHKUHKUHKUHKUHKUHKU
```

13. Write a function named `triangle` that uses the turtle graphics library to draw a triangle. The functions should take arguments for the X and Y coordinates of the triangle's vertices, and the color with which the triangle should be filled. Demonstrate the function in a program by calling it from main function. The coordinates and line color are taken from the user by the main and passed to the function through parameter list.

Hint: Function header for the triangle function should like the followings

```
def triangle (x1,y1,x2,y2,x3,y3,color)
```

14. There are three seating categories at a stadium. Class A seats cost $20, Class B seats cost $15, and Class C seats cost $10. Write a program that asks how many tickets for each class of seats were sold, then displays the amount of income generated from ticket sales. In your program there should be a function named `showIncome` which receives how may tickets are sold from each groups from the caller then calculates the income and display it on the screen. Main function should get the number of tickets sold from each classes and pass them to function.

Example terminal output of the program is given below:

```
Enter count of A seats: 12
Enter count of B seats: 11
Enter count of C seats: 14
Income from class A seats: $240
Income from class B seats: $165
Income from class C seats: $140
Total Income: $545
```

15. Compute π : You can approximate by using the following series:

$$\pi = 1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} - \frac{1}{11} + \cdots + \frac{(-1)^{n+1}}{2n-1}$$

Write a program that displays the π value for *n* = 100000, 200000, . . ., and 1000000.

In your program, there will be a function named `pi` that receives a positive integer number from the caller. The function calculates the desired number of terms and displays the result.

Design your main program such that calling the function `pi` and generates a table similar to the following.

```
For n:  100000 calculated PI is  3.141583
For n:  200000 calculated PI is  3.141588
For n:  300000 calculated PI is  3.141589
For n:  400000 calculated PI is  3.141590
For n:  500000 calculated PI is  3.141591
For n:  600000 calculated PI is  3.141591
For n:  700000 calculated PI is  3.141591
For n:  800000 calculated PI is  3.141591
For n:  900000 calculated PI is  3.141592
For n: 1000000 calculated PI is  3.141592
```