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CSC1017/19F Assignment 2B (70 Marks)

Console Input/Output and Mathematics

Assignment Instructions

This assignment involves constructing Python programs that use input and output statements, and statements that perform numerical manipulation. You will be using the 'print' statement, 'input' function, real number division, multiplication, and square root.

The print statement

The print statement is used to output values to the screen. The following example outputs "Hi" and causes any further output to begin on a new line.

```
print ("Hi")
```

You can use additional attributes of the print statement to control what is printed at the end of each print statement (end="\n") and what separates each value in a list of values (sep=" "). For example:

```
print ("Hi", end='')
```

displays "Hi" and any further output will continue on the same line.

```
print ("a","b","c")
```

displays "a b c"

```
print ("a","b","c", sep="|")
```

displays "a|b|c".

The input function

The input function is used to obtain keyboard input from the program user. For example,

```
t = input()
```

When this statement is executed, the user may type in something and press enter. Whatever is typed is stored in the variable t.

The function can output a prompt to the screen. For example,

```
n = input("Enter your name: ")
```

When this statement is executed, the text 'Enter your name: ' appears on the screen. The user may type in something and press enter. Whatever is typed appears after the text i.e. on the same line. It is stored in the variable n.

The following example uses a new line character, '\n' at the end of the output text. This causes the point of input/output to move to a new line.

```
n = input("Enter your name:\n")
```

Whatever the user types will appear on the line below 'Enter your name:'.

END

Math square root

The Python language has many preconstructed modules containing program components that programmers may use in their own programs. A foundational one is the Math module. It provides mathematical functions such as square root, sine, cosine, tangent.

For question 3 you will need square root. Say you want to find the square root of a value stored in a variable, `v`, you would write `math.sqrt(v)`. For example, in the following example, we find the square root of `v` and store it in a variable `r`.

```
r = math.sqrt(v)
```

There is an additional step to using sqrt and that is your program must include a statement that it is going to use the math module. So, at the top of your program, you write:

```
import math
```

Question 1 [20 marks]

Write a program called `spam.py` to generate a personalised spam message based on the user's full name, country and a sum of money. Use the following template for the spam message, with a blank line before the message starts.

```
Dearest <first_name>
It is with a heavy heart that I inform you of the death of my father,
General Imsofayk <last_name>, your long lost relative from Mapsfostol.
My father left the sum of <money>USD for us, your distant cousins.
Unfortunately, we cannot access the money as it is in a bank in <country>.
I desperately need your assistance to access this money.
I will even pay you generously, 40% of the amount – <money40>USD,
for your help.  Please get in touch with me at this email address asap.
Yours sincerely
John <last_name>
```

***Sample I/O** (The input from the user is shown in **bold** font – DO NOT program this):*

```
Enter first name:
Lebeko
Enter last name:
Poulo
Enter sum of money in USD:
450000
Enter country name:
Lesotho

Dearest Lebeko
It is with a heavy heart that I inform you of the death of my father,
General Imsofayk Poulo, your long lost relative from Mapsfostol.
My father left the sum of 450000USD for us, your distant cousins.
```

```
Unfortunately, we cannot access the money as it is in a bank in Lesotho.
I desperately need your assistance to access this money.
I will even pay you generously, 40% of the amount - 180000.0USD,
for your help.  Please get in touch with me at this email address asap.
Yours sincerely
John Poulo
```

Hint:

- Use "\n" at the end of your input string to move to the next line before input.
- Set the separator for tricky formatting e.g. `sep=''`.

Question 2 [20 marks]

Given a side of length *a (a > 0),* the area of a pentagon may be calculated as follows:

$$A = \frac{1}{4}\sqrt{5(5+2\sqrt{5})}a^2$$

Write a program called 'pentagon.py' that asks the user to enter the length of side, a, of a pentagon and then calculate and print the area.

Sample I/O *(The input from the user is shown in* ***bold*** *font – DO NOT program this):*

```
Enter the length of side, a:
```

4

```
The area of a pentagon of side 4 is 27.53.
```

HINT:

- Use the Python `format()` method to format your output to 2 decimal places. The Python `format()` method allows you to format strings dynamically. It is commonly used for controlling number precision, alignment, and text styling.
- For example,

  ```
  name = Alice
  mark = 73.4764
  print("My name is {} and I scored {:.2f} in test 3.".format(name, mark))
  ```

  The above print statement produces the following output:

  ```
  My name is Alice and I scored 73.48 in test 3.
  ```

Question 3 [30 marks]

Given sides of length a, b, c, the area of a triangle may be calculated as follows (Heron's formula):

s=(a+b+c)/2

Area=sqrt(s(s-a)*(s-b)*(s-c))*

Write a program called '`triangle.py`' that asks the user to enter the lengths of the three sides of a triangle, and that calculates and prints the area.

Sample I/O *(The input from the user is shown in* ***bold*** *font – DO NOT program this):*

```
Enter the length of the first side: 3
Enter the length of the second side: 4
Enter the length of the third side: 5
The area of the triangle with sides of length 3 and 4 and 5 is 6.0.
```

Submission

Create and submit to the automatic marker a Zip file called `ABCXYZ123.zip` (where ABCXYZ123 is YOUR student number) containing `spam.py`, `pentagon.py` and `triangle.py`.

NOTES:

1. FOLDERS ARE NOT ALLOWED IN THE ZIP FILE.
2. As you will submit your assignment to the Automarker, the Assignment tab will still say "Not started" or "In Progress" or something similar. THIS IS COMPLETELY NORMAL. IGNORE IT.