CSC1015F Assignment 3

Console Input/Output and Control (if)

Assignment Instructions

This assignment involves constructing Python programs that use input and output statements, '`if`' and '`if-else`' control flow statements, and statements that perform numerical manipulation.

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

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

displays "`a b c`"

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

displays "`a|b|c`"

NOTE Your solutions to this assignment will be evaluated for correctness. *Assignments that follow (starting with Assignment 4) will also be evaluated for the following qualities*:

- Documentation
  - Use of comments at the top of your code to identify program purpose, author and date.
  - Use of comments within your code to explain each non-obvious functional unit of code.
- General style/readability
  - The use of meaningful names for variables and functions.
- Algorithmic qualities
  - Efficiency, simplicity

These criteria will be manually assessed by a tutor and commented upon. In future assignments, up to 10 marks will be deducted for deficiencies.

Question 1 [20 marks]

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

$$s = \frac{a + b + c}{2}$$

$$Area = \sqrt{s * (s - a) * (s - b) * (s - c)}$$

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. Round off the value of the area of a triangle to 2 decimal places.

Sample IO *(The input from the user is shown in* ***bold*** *font*):

```
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 3.0 and 4.0 and 5.0 is 6.0.
```

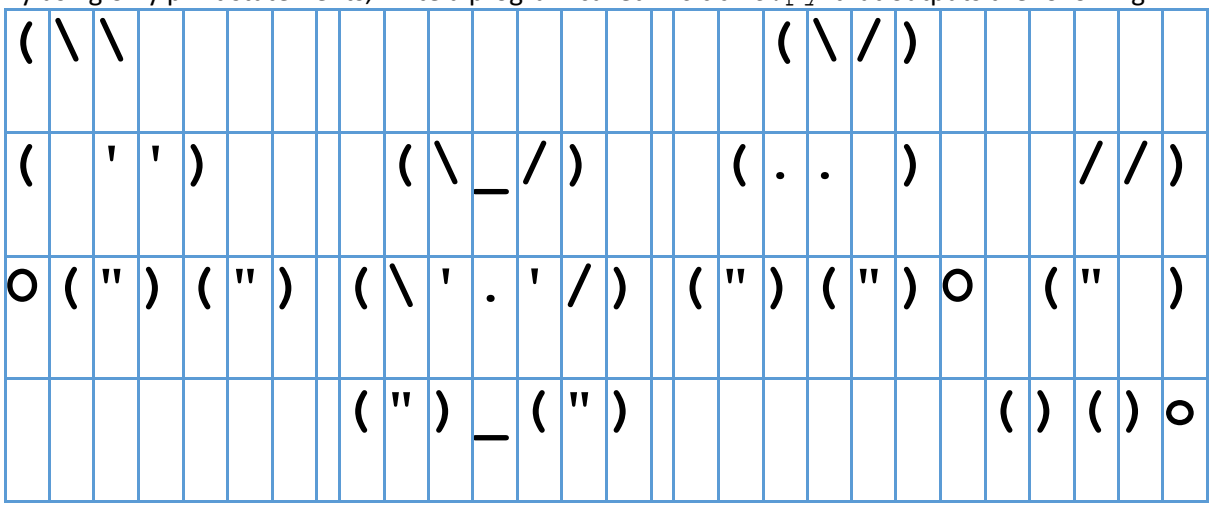
Sample IO *(The input from the user is shown in* ***bold*** *font*):

```
Enter the length of the first side: 2.4
Enter the length of the second side: 6.7
Enter the length of the third side: 3.4
Error: The input does not describe a triangle.
```

HINT: Say you wanted to find the square root of 121 - how would you go about this? In Python (and many other languages), there are built-in functions that can perform such calculations for you. The function to find a square root is '`math.sqrt`' ('`sqrt`' in the '`math`' library).

Question 2 [20 marks]

ASCII Art is a technique to create fancy effects using simple text output.
By using only print statements, write a program called '`rabbit.py`' that outputs the following:



Do not include the blue guides - these are there simply so you can see how many spaces are between characters.
Here's the raw text for further reference:

```
(\\                    (\/)
( '')     (\_/)    (.. )    //)
O(")(")  (\'.'/)  (")(")O  (" )
          (")_(")          ()()o
```

Some of the backslashes (\) may need to be escaped (written as \\ instead). Search online to find out why this is necessary.

Question 3 [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 Fayk <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, 30% of the amount - <money30>USD,
for your help.  Please get in touch with me at this email address asap.
Yours sincerely
Frank <last_name>
```

Sample IO *(The input from the user is shown in* ***bold*** *font*):

```
Enter first name:
Patrick
Enter last name:
Star
Enter sum of money in USD:
1234
Enter country name:
South Africa

Dearest Patrick
It is with a heavy heart that I inform you of the death of my father,
General Fayk Star, your long lost relative from Mapsfostol.
My father left the sum of 1234USD for us, your distant cousins.
Unfortunately, we cannot access the money as it is in a bank in South Africa.
I desperately need your assistance to access this money.
I will even pay you generously, 30% of the amount - 370.2USD,
for your help.  Please get in touch with me at this email address asap.
Yours sincerely
Frank Star
```

Hint: Use "\n" at the end of your input string to move to the next line before input.

Question 4 [20 marks]

Write a program called `leapYear.py` to determine whether a year is a leap year or not. A year is a leap year if (a) it is divisible by 400 or (b) it is divisible by 4 but not by 100. Your program must accept input from the user in the form of an integer representing the year. Then, it checks if it is a leap year or not.

Sample I/O *(The input from the user is shown in* ***bold*** *font):*

```
Enter a year:
2023
2023 is not a leap year.
```

Sample I/O *(The input from the user is shown in* ***bold*** *font):*

```
Enter a year:
2020
2020 is a leap year.
```

Question 5 [20 marks]

Write a program called '`time.py`' for checking the validity of a time entered by the user as a set of three integers. In professional software, it is never assumed that input from users is valid so you too need to do this in your programs.

In this case, you want to check if the number of hours is between 0 and 23 (inclusive), the number of minutes is between 0 and 59 (inclusive) and the number of seconds is between 0 and 59 (inclusive).

Sample IO *(The input from the user is shown in* ***bold*** *font*):

```
Enter the hours: 21
Enter the minutes: 7
Enter the seconds: 7
Your time is valid.
```

Sample IO *(The input from the user is shown in* ***bold*** *font*):

```
Enter the hours: 25
Enter the minutes: -7
Enter the seconds: 0
Your time is invalid.
```

Sample IO *(The input from the user is shown in* ***bold*** *font*):

```
Enter the hours: 21
Enter the minutes: 7
Enter the seconds: 72
Your time is invalid.
```

Submission

Create and submit to the automatic marker a Zip file called `ABCXYZ123.zip` (where ABCXYZ123 is YOUR student number) containing `rabbit.py`, `spam.py`, `time.py`, `leapYear.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 Complete”. THIS IS COMPLETELY NORMAL. IGNORE IT.