CSC1015F Assignment 2

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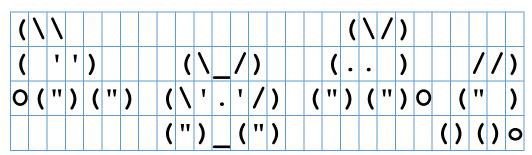
```
print ("a","b","c")
```

displays "a b c"

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

displays "a|b|c"

Question 1 [25 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:

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

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 2 [25 marks]

Create a program called 'raceresult.py'. It should allow the user to enter the information about the participant of a marathon, outputting the information formatted as shown in the sample IO.

Sample I/O:

```
Enter runner's name:
N Marrengane
Enter day of month:
24
Enter month of year:
3
Enter year:
2021
Enter completion time (in mins):
140.343
Enter prize money (in rand):
550

N Marrengane completed the race on 24/3/2021 in 140.343 minutes.
The runner wins R550.
Average time per kilometer was 3.32605758976182 minutes.
```

Note: A marathon is 42.195 kilometers.

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 3 [25 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:

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

Sample IO:

```
Enter the hours:
25
Enter the minutes:
-7
Enter the seconds:
```

```
0
Your time is invalid.
```

Sample IO:

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

Question 4 [25 marks]

Given a right-angle triangle with sides of length a, b, c, where c is the longest side, Pythagoras' Theorem says:

$$a^2 + b^2 = c^2$$

Given a and c, b can be calculated using:

$$b = \sqrt{(c^2 - a^2)}$$

Write a program called 'side.py' that asks the user to enter the lengths a and c, and calculates b.

Following on from question 3, your program should validate user input. You may assume that the values entered by the user are *float*s, i.e. real numbers, but the program should check they are positive. If the user enters a value that is less than or equal to zero, the program should print an error message.

Sample IO:

```
Enter the length of side a:
3.5
Enter the length of side c:
5
The length of side b is 3.570714214271425.
```

Sample IO:

```
Enter the length of side a:
3
Enter the length of side c:
-5
Sorry, lengths must be positive numbers.
```

Sample IO:

```
Enter the length of side a:
-3
Enter the length of side c:
5
Sorry, lengths must be positive numbers.
```

Submission

Create and submit to the automatic marker a Zip file called `ABCXYZ123.zip` (where ABCXYZ123 is YOUR student number) containing `rabbit.py`, `raceresult.py`, `time.py` and `side.py`.