CSC1015F Assignment 1D

Introduction

Assignment Instructions

The two questions in this assignment are slightly more substantial. Question one involves a program that consists of the right statements but in the wrong order. Last but not lease, Question 2 gives us some level of independence whereby we get to write our own program as per the given specification.

Question 1 [30 marks]

You will find the following program on the Amathuba page for this assignment. It is called '`convert_rands.py`'.

NOTE: leave the author of the code as "Lebeko Poulo" as that will be a way of referencing/acknowledging the author. Remember that if we do not acknowledge the author, that constitutes plagiarism.

```
rands = cents // 100

fifty_cents = cents // 50

cents = cents % 50

cents = cents % 5


print(f"{rands} Rands, {fifty_cents} x 50c, {twenty_cents} x 20c,
{ten_cents} x 10c, {five_cents} x 5c, {one_cents} x 1c")


cents = int(input("Enter the amount in cents: "))

one_cents = cents

five_cents = cents // 5

cents = cents % 100

cents = cents % 20


ten_cents = cents // 10

twenty_cents = cents // 20

cents = cents % 10
```

The program consists of correct statements that are in the wrong order. Here is an example of how the program is supposed to behave:

```
Enter the amount in cents: 1559
15 Rands, 1 x 50c, 0 x 20c, 0 x 10c, 1 x 5c, 4 x 1c
```

Download the program and rearrange the statements so that it operates correctly.

HINT: check you understand what the integer operations '//' and '%' do, and think how, given an amount in cents, you would calculate the equivalent amount of rands, 50 cents, 20 cents, 10 cents, 5 cents and 1 cents.

Question 2 [30 marks]

Albert Einstein[1] once said "*it followed from the special theory of relativity that mass and energy are both but different manifestations of the same thing — a somewhat unfamiliar conception for the average mind.*"

You do not need to know the Physics behind the equation below. However, if you are curious, you may read further here: https://www.britannica.com/science/E-mc2-equation. Our interest is to write a python program to calculate the energy, *E*, given the values of the mass, *m*, and the speed of light, *c* based on the following equation:

$$E = mc^2$$

Task:

Write a program called '`energy.py`' to input the values of the integer numbers *m* and *c*, then calculate and output the value of the energy quantity from the equation above.

*(**Note**: recall that, in Python, the statement d ** 3 is equivalent to d^3)*

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

```
Enter the value of m:
6
Enter the value of c:
6
The value of energy, E, is: 216
```

[1] See https://www.forbes.com/sites/startswithabang/2018/01/23/the-three-meanings-of-emc2-einsteins-most-famous-equation/?sh=e19fd8a71c0b Last accessed on 16th February 2023.

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

```
Enter the value of m:
4
Enter the value of c:
6
The value of energy, E, is: 144
```

Submission

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