COL100 Assignment 2
Holi Semester : 2021-2022

Deadline: 11:59 pm, 9 April, 2022

General Instructions

You should attempt this assignment without taking help from your peers or referring to online resources except for documentation (we will perform a **plagiarism check** amongst all submissions). Any violation of above will be considered a breach of the honor code, and the consequences would range from **zero marks** in the assignment to a **disciplinary committee action**.

Submission Instructions

1. If you are solving the i^{th} question, code in a file named `qi.py`. For eg. solution code for the 2^{nd} question goes inside a file named `q2.py`.
2. Submit your code in a `.zip` file named in the format `<EntryNo>.zip`. Make sure that when we run unzip `<EntryNo>.zip`, a folder `<EntryNo>` should be produced in the current working directory. For eg. if your entry number is `2021CS5XXXX`, then your zip file would be `2021CS5XXXX.zip` and upon unzipping, it should produce a folder `2021CS5XXXX` containing files `q1.py`, `q2.py`, `q3.py` and so on. For reference, we would be uploading a sample zip file on Piazza containing the exact directory structure which is mentioned.
3. Your submissions will be **auto-graded**. Make sure that your code follows the specifications (including directory structure, input/output, submission `.zip` file) of the assignment precisely.

Some Clarifications

1. Every problem description is followed by some examples showing how exactly input and output is being expected. Please refer to them for more clarity.
2. If a problem involves printing a floating point number, your output is considered correct as long as it is within 10^{-5} of the actual answer. For eg. if you output a floating point number x, and the actual answer is t, then your output is correct if $|x - t| < 10^{-5}$.
3. If you still have any more doubts, feel free to shoot them at Piazza.

This assignment relies heavily on the Python `input` and `print` functions, make sure you understand how to use them. It also tests your understanding on basic variable handling required in programming.

1 Basic Calculator (5 marks, In-Lab component)

Write a python program to perform the following binary operations on two integers a and b:

- Addition
- Subtraction
- Multiplication
- Division
- Modulus

Your program should prompt the user to enter the two numbers, namely a and b (You can assume that $b \neq 0$).

Note: a, b are not necessarily integers and can take any real value.

Example 1:
INPUT:

```
2
4
```

OUTPUT:

```
6
-2
8
0.5
2
```

EXPLANATION:
Here in this example we are provided with two numbers, $a = 2$ and $b = 4$. So, there addition will be $a + b = 6$, their subtraction will be $a - b = -2$, their multiplication will be $a * b = 8$, their division will be $a/b = 0.5$ and their modulus will be $a\%b = 2$.

Example 2:
INPUT:

```
1
2
```

OUTPUT:

```
3
-1
2
0.5
1
```

2 Print Area (5 marks)

Write a single program to compute the area of the following:

- **Circle**: Input the radius and print the area.
- **Square**: Input the length of a side and print the area.
- **Rectangle**: Input the length and breadth and print the area.
- **Parallelogram**: Input the base and height, and print the area.
- **Trapezium**: Input the length of the parallel sides, and the perpendicular distance between them and print the area.

Your program should prompt the user to enter 9 numbers. First will be the radius of circle, second will be length of a side in square, third will be length of rectangle, fourth will be breadth of rectangle, fifth will be base of parallelogram, sixth will be height of parallelogram, seventh and eighth will be length of parallel sides of trapezium and ninth will be perpendicular distance between the parallel sides of trapezium. Note: Take value of π as 3.14.

Note: All the above numerical quantities can take any real value.

Example 1:
INPUT:

```
4
10
3
9
2
8
5
9
7
```

OUTPUT:

```
50.24
100
27
16
49.0
```

EXPLANATION:
Following are the calculations involved in above example:
$\pi \cdot r^2 = 3.14 \cdot 4 \cdot 4 = 50.24$
$a^2 = 10^2 = 100$
$a \cdot b = 3 \cdot 9 = 27$
$a \cdot h = 2 \cdot 8 = 16$
$h \cdot (a + b)/2 = 7 \cdot (5 + 9)/2 = 49.0$

Example 2:
INPUT:

```
5
5
4
6
3
4
11
10
5
```

OUTPUT:

```
78.5
25
24
12
52.5
```

3 What's my SGPA for this semester ? (5 marks)

Write a python program to compute SGPA for a given semester. Recall that if you took n courses in a semester with credits $c_1, c_2 \ldots c_n$ and you got $g_1, g_2 \ldots g_n$ grades in these courses respectively, your SGPA is calculated as the weighted mean of these grades i.e.

$$SGPA = \frac{\sum_{i=1}^{n} c_i \cdot g_i}{\sum_{i=1}^{n} c_i} \tag{1}$$

However, for this problem, we will assume that you took $n = 5$ courses in a semester. The program should accept as input, credits and grades obtained for each of these 5 courses and then output the final SGPA for the semester. For each of the 5 courses, we provide the credits and grade obtained in that course, each in a new line.

Note: It is guaranteed that credits and grades obtained are both integers.

Example 1:
INPUT:

```
4
10
3
9
2
8
5
9
2
10
```

OUTPUT:

```
9.25
```

EXPLANATION:
Following are the credits and grades obtained in 5 courses:
$c_1 = 4, g_1 = 10$
$c_2 = 3, g_2 = 9$
$c_3 = 2, g_3 = 8$
$c_4 = 5, g_4 = 9$
$c_5 = 2, g_5 = 10$
So, the final SGPA obtained is 9.25.

Example 2:
INPUT:

```
5
0
4
0
3
0
2
0
1
10
```

OUTPUT:

```
0.66
```

EXPLANATION:
$c_1 = 5, g_1 = 0$
$c_2 = 4, g_2 = 0$
$c_3 = 3, g_3 = 0$
$c_4 = 2, g_4 = 0$
$c_5 = 1, g_5 = 10$
SGPA obtained is 0.66.