

Python for data scientists SP1 2021/2022

Assignment 1

There are three problems in this assignment.

You can either submit:

- A Python script for Problem 1 (solutionA1_P1.py)
- A Python script for Problem 2 (solutionA1_P2.py)
- A PDF file for Problem 3

Or a Jupyter Notebook with clearly marked solutions for Problem 1, Problem 2, and Problem 3.

Note:

- Think about different inputs which might help you to assure that your implementation is correct.
- If you add any details or make any assumptions, please clearly describe in your submission.

1.1. Problem 1

Write a program that:

- takes three inputs (i.e., three sides of a triangle);
- calculates the perimeter and the area of a triangle;
- outputs the perimeter and the area of the triangle.

See [here](#) to see the equations to calculate the perimeter and the area of a triangle.

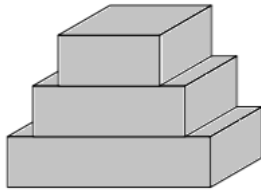
An example is shown below.

```
Enter the length of the first side : 4
Enter the length of the second side : 5
Enter the length of the third side : 7
Perimeter: 16.0
Area: 9.797958971132712
```

1.2. Problem 2

The most common way to place statues is to place them on majestic plinths. Depending on the dimensions of the statue, the base must be more or less high and offer a more or less large surface to put the statue in there.

Here is an example of a plinth.



A plinth is thus made up of floors: each floor having a height equal to one unit and a depth equal to two units. The width of the floors decreases by one unit from one floor to the next.

```
floor's volume = height*depth*width
```

However, statues builders often find it difficult to estimate the amount of concrete needed to build each plinth. To help them, you are asked to write a program that:

- requires two integers, representing the width of the plinth at ground level and the width of the plinth at the highest level, and
- then calculates and prints the volume of the plinth.

An example is shown below.

Enter the width of the plinth at the highest level : 3

Enter the width of the plinth at ground level : 8

Volume of plinth : 66

1.3. Problem 3

1. Based on Lecture 2 and readings about data types and structure, pick two data types (array, list, tuple, set, dictionary) and explain the difference between them and give some scenarios where it is suitable to use them.
2. Do you think that there is a distinction between data types and their naming in Python, and data types and data structures more generally in Computer Science? Explain your answer and give some examples. Don't forget to state any reference sources you used.