

Python for data scientists SP1 2022/2023

Assignment 1

There are three problems in this assignment.

To submit:

- A Jupyter notebook (.ipynb) with clearly marked solutions for: Problem 1, Problem 2, and Problem 3. The notebook must show examples that you used to run the codes, and the outputs that you get after running the codes.
- An html file (a result of “Save and Export Notebook As” html of your Jupyter notebook) after you run all the codes.

Do not forget to add your name and your group partner’s name at the very top of your notebook.

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 two inputs (i.e., length and width of a rectangle).
- calculates the perimeter, the length of the diagonal, and the area of the rectangle.
- outputs the perimeter, diagonal length, and the area of the rectangle.

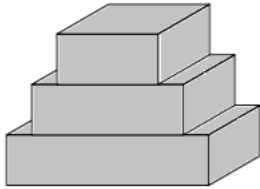
An example is shown below.

```
Enter the length of the rectangle : 4
Enter the width of the rectangle : 5
Calculating the properties of the rectange!
Perimeter: 18.0
Diagonal length: 6.4031
Area: 20.0
```

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

You are provided with a file (A1.tar.gz) that consists of a directory with many files. Each of the files inside that tar.gz file lists health care services in a particular country in the EU.

Your tasks are:

- Write code to open the tar.gz file and combine the content of all the files in that tar.gz file into one csv file.
- Show the number of health care services listed per country. You can show this in a table, or table like format.