Homework

Please solve the following 5 problems using Python language. These problems are typical, so if you are still not familiar with Python you can easily find the solution in internet. The main idea of assignment to become familiar with Python and GitHub, both of these tools are essential for DS work. Solution files must be named in a following way: *task_1.py*, *task_2.py* etc.

1. Your solution must be published on a GitHub in your personal repo named *YourName_HW1* (i.e. *DmitryVolkov_HW1*).
2. Link to the repo you should send to my email *dmitry.volkov@skoltech.ru* as well is a personal Slack message.

Deadline 16.05.2023 23:59 GMT + 3.

Good luck!

Task 1

Write a program that takes three integers as input, one number per line, and outputs to the console in three lines first the maximum, then the minimum, then the remaining number:

Maximum
Minimum
Remaining

Repeating numbers can also be input.

Sample Input 1:

```
8
2
14
```

Sample Output 1:

```
14
2
8
```

Sample Input 2:

```
23
23
21
```

Sample Output 2:

```
23

21

23
```

Task 2

Write a program that reads from standard input, one integer number per line, and after the first zero entered, outputs the sum of the numbers received as input.

Sample Input 1:

```
5
-3
8
4
0
```

Sample Output 1:

```
14
```

Sample Input 2:

```
0
```

Sample Output 2:

```
0
```

Task 3

Write a simple calculator that reads three lines of user input: first number, second number and operation, then applies the operation to the entered numbers ("first number" "operation" "second number") and displays the result.

Supported operations: *+, -, /, *, mod, pow, div*, where
mod - taking the remainder of the division,
pow - exponentiation,
div - integer division.

If you do division, and the second number is 0, you should print the line "*Division by 0!*"

Note that the input to the program are real numbers.

Sample Input 1:

```
5.0
0.0
mod
```

Sample Output 1:

```
Division by 0!
```

Sample Input 2:

```
-12.0
-8.0
*
```

Sample Output 2:

```
96.0
```

Sample Input 3:

```
5.0
10.0
/
```

Sample Output 3:

```
0.5
```

Task 4

Write a program that outputs part of the sequence 1 2 2 3 3 3 4 4 4 4 5 5 5 5 5 ... (the number is repeated as many times as it is equal). The input of the program is a non-negative integer n - the number of elements of the sequence the program should display. The output is a sequence of numbers, written with a space in one line.

For example, if n = 7, the program should output 1 2 2 3 3 3 4.

Sample Input1:

```
7
```

Sample Output2:

```
1 2 2 3 3 3 4
```

Sample Input2:

```
10
```

Sample Output2:

```
1 2 2 3 3 3 4 4 4 4
```

Sample Input3:

```
2
```

Sample Output3:

```
1 2
```

Task 5

Implement a compression algorithm that compresses repetitive characters in a string.

The encoding is performed as follows:
s = *'aaaabbcaa'* is converted to '*a4b2c1a2*', i.e. groups of identical characters of the original string are replaced by this character and the number of its repetitions in this position of the string.

Write a program that reads a string, encodes it with the suggested algorithm and outputs the encoded sequence to the standard output. The coding must be case-sensitive.

Sample Input 1:

```
aaaabbcaa
```

Sample Output 1:

```
a4b2c1a2
```

Sample Input 2:

```
abc
```

Sample Output 2:

```
a1b1c1
```

Sample Input 3:

```
aaaaaabbBBb
```

Sample Output 3:

```
a6b2B2b1
```