Computer Programming 1

Laboratory

Exercise 1: Harmonic Series

Given that:

$$\sum_{i=0}^{N} \frac{1}{i} = 1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \ldots + \frac{1}{N}$$

Write a C++ program that calculates the approximate value of the Harmonic series. The upper limit of this series (the N value) is:
- (**minimum**) a constant value in the code
- (**best**) given in input by the user

Implementation constraints:
- Use at least **one** function (different from “main()”)
- No use of global variables
- Use a **recursive function**
- (optional) Check the input from the user

Estimated time ~30 min

Exercise 2: Program with Arrays (1)

We are using a 4x5 array to represent the **five** grades gotten by the **four** students of our class. Each **row of the array represents the grades of a student** and each **column a specific grade**, from 0 to 30. We assume that all students always have five valid grades.
(**minimum**) The grades are constant values in the code
(**best**) The grades are given in input by the user

We want to write a program which computes:
1) For each student: minimum, maximum and average of grades
2) For the class: minimum, maximum and average of grades

Implementation constraints:
- Use at least **two** functions (different from “main()”)
- No use of global variables
- (optional) Use the passage by pointers
- (optional) Check the input from the user

Estimated time ~45 min

Exercise 2: Program with Arrays (2)

For instance, **given the following array**:

```
int grades2[4][5] = {
        {18, 24, 20, 24, 25 },
        {20, 21, 18, 10, 20 },
        {17, 24, 20, 30, 30 },
        {30, 30, 30, 30, 30 },
};
```

We want **to output something like**:

```
Student 0:
        Grades: 18 24 30 27 20
        Average: 23.8
        Min: 18
        Max: 30
Student 1:
        (...)
```

```
Class:
        Average: 23.55
        Min: 10
        Max: 30
```