3. Tutorial/practical exercises

Exercise 1

Determine whether the following problems are well or ill-defined. In the first case, determine the input and the output of the algorithm that solves the problem. Try also to find the characteristics of the input and the output.

1 – A natural number is a prime number.
2 – A series of integers is sorted incrementally.
3 – A series of integers does not contain big numbers.
4 – In a map that represents countries, we would like to color countries so that neighboring countries should not have the same color. The number of colors should be minimal.
5 – We would like to design a triangle with a beautiful mosaic.

Exercise 2

Consider an algorithm that computes the sum of integers up to a given number n (it is not required to write an algorithm).

1 – Describe the input and the output of the algorithm.
2 – How many additions are required to obtain the result?
3 – Can you figure out a more optimal way to do the same thing? In this case compare the number of operations.
4 – Could we do the same improvement with the product of the integers?