9. Tutorial/practical exercises

To do the practical exercises, using a Python-friendly IDE is strongly recommended. There are several options available, and Visual Studio Code is one of the finest. This free tool may be customized with several development extensions that make Python programming fun. Another tool, PyCharm, offers similar functionalities but is not entirely free. It is, therefore, possible to download a limited free version of this powerful tool.

Another possibility, although less interesting, is to use a mobile-based tool. Students can download Pydroid to their smartphones. This tool allows the development of all programs in this course. Finally, several online tools, known as playgrounds, allow to write and execute Python programs (for instance Programiz).

This course will assume that students are using Visual Studio Code. In particular, we will use the debugging features to better understand program execution and identify errors. We also suppose that the used version of Python is at least 3.10.

Exercise 1

1 – Write an algorithm and a Python program that computes the value of a polynomial of the form $ax^2 + bx + c$. The user should enter the three coefficients and the value of x.

2 – Give the flowchart of the algorithm.

3 – In Visual Studio Code, place a breakpoint on the first line of your program. Define one or many watches on your variables. Execute the program step by step and keep looking to how variables change.

Exercise 2

1 – Write an algorithm and a Python program that reads the radius of a sphere. It should print the surface of the sphere and the volume inside it.

2 – Give the flowchart of the algorithm.

Exercise 3

Give the evaluation order of the following expressions then give their values (we suppose that $x = 2$, $y = 2$, $z = 0$ and $u = False$)

1 – `(x+y)*z-1`

2 – `(3-x)//(z**2+3)*4`

3 – `3+x<4*z-1 and not u`

4 – `x+y<y+z<u+x`

Exercise 4

Write an algorithm and a Python program that computes the average and the standard deviation of a series of 4 numbers entered by keyboard.

Exercise 5

Cars are checked in at parking lots. When a car leaves the total parking time is calculated in minutes. A slot corresponds to 30 minutes and costs 25 AD. An already started slot is fully due.

1 – Write an algorithm and a Python program to compute the amount to be paid given the parking time in minutes.

2 – Give the flowchart of your algorithm.