Programming Fundamentals for Data Science

Laboratory Session 1

1. Familiarise yourself with the Jupyter Notebook environment. Run several commands, such as:

print('Hello World')

a = 10

b = 5

print(a, '+', b, '=', a+b)

Use several cells to run the commands.

2. Define and test 4 functions in Python, which perform the arithmetic operations addition, subtraction, multiplication and division. While implementing the fourth function, avoid division by zero.

3.1. A quadratic equation has the following general formula:

ax2 + bx + c = 0

where a, b and c are the coefficients of the equation

Those equations can have 0, 1 or 2 solutions, which can be calculated by using the following formula:

𝑥1,2=−𝑏±√𝑏2−4𝑎𝑐2𝑎

Write a Python script, which reads the coefficients of a quadratic equation and calculates the solutions. Provide meaningful user input and output.

3.2. Explain what will happen if the discriminant, that is the expression under the square root

d = b2-4ac, is equal to zero. Demonstrate such case.

3.3. If unchecked, in case of a negative discriminant the script will generate an error, for example with coefficients a=10, b=5, c=6. Explain why and provide a solution.

3.4. The script will also generate an error if a=0. Explain why and provide a solution.

3.5. The two possible problems with the quadratic equation, negative discriminant and first coefficient equals to zero, can be handled by using one IF statement, starting as follows:

if a == 0 or d < 0:

print('Error')

else:

...

Implement this approach and describe a possible issue with it.