COMPUTER SCIENCES, 2022/2023
Laboratory 2

Main objectives

- Defining variables in Python
- Perform simple calculations based on basic arithmetic operators

Technical content

- Use of arithmetic expressions
- Use of conditional constructs (`if`, `elif` and `else`)

Exercise 1.   Write a program that stores in a constant a positive *five-digit* integer (therefore between 10000 and 99999), and displays the individual digits of which it is composed [P2.16].

For example, having the number 16384, the program must display the following output:

```
1
6
3
8
4
```

Exercise 2.   Write a program that sorts three numbers in ascending order and displays, line by line, the result.

For example, if the three numbers are NUM1=8, NUM2=1, NUM3=20, the program must display:

```
1
8
20
```

After that, extend the program to sort four numbers in descending order and display them.

<u>Hint</u>: the structure of `if elif else` statement is the following:

```python
a = 5
if a > 10:
    print("a is bigger than 10")
elif a < 10:
    print ("a is smaller than 10")
else:
    print("a is equal to 10")
```

Exercise 3. The following pseudocode describes how, in a bookstore, the amount of an order is calculated from the total cost of the books ordered and their number.

- *Read the total cost of books and the number of books.*
- *Calculate taxes (7.5 percent of the total cost of books).*
- *Calculate shipping costs ($2 per book).*
- *The total price of the order is the sum of the total cost of the books, taxes and shipping costs.*
- *View the order amount.*

Write a program in Python that implements this pseudocode. The total cost of books and the number of books must be stored in two constant variables. [P2.32]

Exercise 4. Write a program that stores in two constant variables the lengths of the sides of a rectangle and displays:
- The area and perimeter of the rectangle
- The length of its diagonal
[P2.8]

Exercise 5. Write a program capable of computing the maximum value between three numbers and display the result.
For example, if we have `NUM1=42`, `NUM2=70`, `NUM3=11`, the program must print `70`.
Extend the program to compute the maximum between four numbers and display it.

To be solved at home

Exercise 6. Easter Sunday is the first Sun day after the first full moon of spring. To compute the date, you can use this algorithm, invented by the mathematician Carl Friedrich Gauss in 1800:
1. Let y be the year (such as 1800 or 2001).
2. Divide y by 19 and call the remainder a. Ignore the quotient.
3. Divide y by 100 to get a quotient b and a remainder c.
4. Divide b by 4 to get a quotient d and a remainder e.
5. Divide 8*b+13 by 25 to get a quotient g. Ignore the remainder.
6. Divide 19*a+b-d-g+15 by 30 to get a remainder h. Ignore the quotient.
7. Divide c by 4 to get a quotient j and a remainder k.
8. Divide a+11*h by 319 to get a quotient m. Ignore the remainder.
9. Divide 2*e+2*j-k-h+m+32 by 7 to get a remainder r. Ignore the quotient.

10. Divide h-m+r+90 by 25 to get a quotient n. Ignore the remainder.

11. Divide h-m+r+n+19 by 32 to get a remainder p. Ignore the quotient.

Then Easter falls on day p of month n.

For example, if y is 2001:

a = 6   g = 6   m = 0   n = 4

b = 20, c = 1   h = 18   r = 6   p = 15

d = 5, e = 0   j = 0, k = 1

Therefore, in 2001, Easter Sun day fell on April 15. Write a program that prompts the user for a year and prints out the month and day of Easter Sunday. [P2.21]