Computer science (code 30424) a.y. 2019-2020

Practice 5

You are asked to answer the following questions and solve the following problems:

1) Completion of a program for the simulation of a coin toss

The file to work on is called **Coins.py** and contains part of a program written in Python for the simulation of a coin toss with the aim of verifying empirically that by throwing a coin (not rigged) you have an equal chance of getting heads or tails, that is 50% of throws will be heads and 50% of throws will be tails.

The program is incomplete and contains:

- the importing of the random module;
- two variables, heads and tails, initialized at 0, which will have to store the number of tosses with heads or tails as a result;
- the request to the user to enter the number of coin tosses to be simulated.

You are asked to write the code necessary to complete the program so that:

- it simulates the toss of the coin for the number of times entered by the user and that the outcome of the tosses is stored in the heads or tails variables. Note: it is advisable to use the randint function of the random module, assigning a value to head and a value to tail;
- it shows the following message on the screen with the result of the simulation (on two lines):
  Heads tosses = XX
  Tails tosses = XX

2) Creation of a program that calculates the divisors of a number

Create a new Python file called **divisors.py** that calculates all the divisors of a number entered by the user. In particular, the program must:

- ask the user for an integer greater than 1;
- calculate and show on screen all the divisors of the entered number (excluded);
- show on screen the number of divisors found at the end of the operation.

3) Creation of a program that calculates the taxes on income to be paid

Create a new Python file called **taxes.py** which, based on the user's annual income, calculates the taxes to be paid and asks how much he/she wants to save after paying the taxes. In particular, the program must:

- ask the user his/her annual income (allowing to enter also numbers with decimals);
- calculate the taxes to be paid based on the following table

Income	Taxes rates
0 – 10,000 euros	0%
10,001 – 29,000 euros	20%
29,001 – 65,000 euros	30%
65,001 – 110,000 euros	40%
110,001 or more	45%

- show a message on screen stating the amount of taxes to be paid (in euros) and the income available after paying the taxes, both with two decimals;
- ask the user how much he/she wants to save of the income available after paying the taxes (allow to enter also numbers with decimals). Make sure that this number cannot exceed 50% of income available. If not, ask the user to enter again how much he/she wants to save until the entered number is correct.

4) Creation of a program that shows on screen some numbers

Create a new Python file called **range.py** that shows on screen all the numbers between two numbers, excluding the multiples of 3 and 5. In particular, the program must:

- ask the user two integer numbers, one between 0 and 10 (both included) and the other greater than 10;
- make sure that if the entered numbers do not meet the requirements, the user is asked again to enter the numbers until they are both correct;
- show on screen all the numbers between the first and the second entered number (both included), except the multiples of 3 and the multiples of 5.