COMPUTER SCIENCES, AA 2020/2021

Laboratory exercise 6

Goals of the exercise

- Design, implement and invoke functions, with and without arguments, and with and without return values
- Breakdown complex problems into simpler problems

Technical contents

- Definition and use of functions
- Passing parameters when a function is invoked
- Use of the `return` statement

To be solved in the laboratory

1. Write the function:
   `def countVowels(string)`
   which returns the number of vowels in the string string . The vowels are the letters a, e, i, o and u, in addition to their respective capital versions. [P5.6]

2. Write the function:
   `def countWords(string)`
   which returns the number of words in the string. Words are sequences of characters separated by spaces. For example,
   `countWords("Mary had a little lamb")`
   returns 5. [P5.7]

3. Write a function:
   `def find(string , match)`
   that checks whether the match string is contained in the string:
   `b = find("Mississippi", "sip") # Assigns true to b` [P5.17]

Hint: try to write the code to search in the string by yourself.

4. A non-governmental organization needs a program to calculate the share of financial aid to be allocated to each family in need of assistance. The formula is as follows:
    - If the family's annual income is between $30,000 and $40,000 and the family has at least three children, the benefit is $1,000 for each child.
    - If the family's annual income is between $20,000 and $30,000 and the family has at least two children, the benefit is $1500 for each child.
    - If the family's annual income is less than $ 20,000, the benefit is $2,000 for each child.

    Write a function that does these calculations, then write a program that asks the user to provide the annual income and number of children of each family, displaying the corresponding value returned by the function. Use -1 as the sentinel value to end data entry. [P5.28]

To be solved at home

5. Write a function that calculates the balance of a bank account after a given number of years have elapsed, starting with a given initial balance and a given annual interest rate, crediting the interest annually. [P5.22]

6. Write a program that converts a Roman numeral, such as MCMLXXVIII, into its decimal representation. Tip: First, write a function that returns the numerical value of each single letter, then use the following algorithm:

    total = 0
    As long as the string ***s*** *containing the Roman numeral is not empty*
        If ***value(first character of s)*** *is at least equal to* ***value(second character of s)*** *or* ***s*** *has length 1*

*Add **value(first character of s)** to total.*

Delete the first character of s.

Otherwise

*Add the difference **value(second character of s) - value(first character of s)** to the total*

Delete the first and second characters of s.

[P5.27]