Algorythms and Python

Test

Lenght : 1h30

All documents available

Please return your answers in a .zip file named NAME_Surname_CPI_CC_2021 (Ex : GOSSWILLER_Robin_CPI_CC_2021.zip)

Theory (4 points)

1. Encode in binary and hexadecimal (please show all steps in your answer)
   - 27
   - 2021

   Also encode in binary (please show all steps in your answer)
   - -17
   - -486
2. Is Python an interpretated or compiled language ? What does it mean ?
3. In the following list, which variable name(s) are/is considered correct under the camel case convention ?
   (a) myvariable
   (b) myVariable
   (c) MyVariable
   (d) MYVARIABLE
4. Give the following values : With myList = [2,4,6,8,10,12,14,16]
   - myList[0]
   - myList[4]

   With myWord = "programmingInPython"
   - myWord[7]
   - myWord[4 :10]

Exercice 1 (2 points)

Write a program that prints the multiplication table from 1 to 10.

Example for 1 to 4 :

1	2	3	4
2	4	6	8
3	6	9	12
4	8	12	16

Exercice 2 (3 points)

Write a program that outputs all the divisors of an integer

Example : 30 would output 1, 2, 3, 5, 6, 10, 15, 30

Exercice 3 (3 points)

1. Without using count(), write a program that output the number of time the letter ’e’ is found in a word.
2. Create another program that counts the number of times the sequence of two characters "er" is found in a word.

   For example, "Clever" would output 1, "Cerberus" would output 2, and "erererer" would output 4.

Exercice 4 (3 points)

We want to create a simple calculator. Here is how the program should work :

- The program asks the user for an input (integer), then another one (integer)
- The program then asks for a third input, which is one of four letters : a(ddition), s(ubstraction), m(ultiplication) or d(ivision)
- The program then outputs a (operation) b

For example :

```
Please input the first number : 5
Please input the second number : 2
Please input the operation : m

Result : 10
```

With 5, 2 and m being the user's inputs.
Note : make sure, in the case of a division, that b!=0 (display an error message if that is the case)

Exercice 5 (3 points)

Write a program that takes a list of words and creates another list ex2Answer with all 'e' and 'E' replaced by '3'

For example, with the following list :

```
  ex2List = ["HEI", "Engineers", "for", "the", "world"]

#output :
ex2Answer = ["H3I", "3ngin33rs", "for", "th3", "world"]
```

Exercice 6 (4 points)

Given an integer m by the user, write a program that give its binary encoding, with the following specifications :

- The result should be in a list, with each element of the list being a separate bit
- Format should use the smallest number of bits that is a multiple of 4
- Padding should be done with 0 as needed
- First bit is a sign bit
- Negative numbers are encoded using CL2

The encoding process must be done using simple operations (this excludes all built-in functions that automaticaly convert in binary such as bin() or convert())