

Computational Thinking and Programming – A.Y. 2018/2019

Second partial written examination (01) – 17/12/2018

Given name: _____

Family name: _____

Matriculation number: _____

University e-mail: _____

Please answer to the following 5 questions [40 minutes max, 1 point each, max score: 5 points]

1. Describe the steps characterising the dynamic programming algorithmic approach.
2. Describe the main characteristics that the data structure *dictionary* has.
3. Write down the Python function `def merge_sort(input_list)` implementing the *merge sort* (the function `merge` can be used without providing an implementation).

4. Consider the first nine characters (spaces excluded) of the string composed by concatenating your family name and your given name in this order and in **lowercase**, and store it in the variable `my_nine_char_name`. Write down the object that is returned after the execution of the following algorithm passing `my_nine_char_name` as input (i.e. `f(my_nine_char_name)`).

```
from collections import deque

def f(name):
    result = []
    d = {0: [], 1: [], 2: []}
    b = deque()
    idx = 0

    for c in name:
        if c in ("a", "e", "i", "o", "u"):
            b.append("0")
        else:
            b.append("1")

    while len(b) != 0:
        idx = idx + 1
        for i in range(len(name) // 3):
            d[i].append(b.pop())

    for i in range(idx):
        result.extend(d[i])

    return result
```

5. Write down a **recursive** implementation of the function `def pal(name)` that takes a full name of a person in input and returns it written from right to left and without any Italian vowel – i.e. *a, e, i, o, u*. Example of execution:

```
my_name = "Silvio Peroni"
pal(my_name) returns "nrP vls"
```