

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

Second partial written examination (02) – 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 backtracking algorithmic approach.

2. Considering a particular central node of a tree as focus, introduce the nomenclature used to refer to all the other nodes.

3. Write down the Python function `def merge(left_list, right_list)` used in the *combine* step of the *merge sort*.

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"
```