Computational Thinking and Programming – A.Y. 2019/2020

First partial written examination (01) – 13/12/2019

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 divide and conquer algorithmic approach.

2. Describe the main components and characteristics that the data structure tree has.

3. Write down the Python function `def fib_recursive(n)` implementing the fibonacci recursive algorithm.

4. The variable `my_mat_list` refers to the list of the ten integer numbers included in your matriculation number, and the variable `my_n_odd` is the number of odd numbers in the matriculation number. Write down the result of the execution of the following function passing `my_mat_list` and `my_n_odd` as input (i.e. `f(my_mat_list, my_n_odd)`).

```
def f(mat_list, n_odd):
    if n_odd <= 0 or len(mat_list) == 0:
        return 0
    else:
        v = 0
        result = list()

        for i in mat_list:
            if v > 0:
                result.append(i)
            if i > 0 and v == 0:
                v = i

        return v + f(result, n_odd - 1)
```

5. Write the function `def depth_first_visit(node)` that takes the root node of a tree as input and returns the list of all its nodes ordered according to a *depth-first visit*. The depth-first visit proceeds as indicated in the image below, where the numbers indicate the order in which the nodes should be visited.