FIRST NAME:
LAST NAME:
NIA:
GROUP:

Second midterm exam

Second Part: Test (3 points out of 10)

Duration: 20 minutes
Highest score possible: 7 points
Date: May 12, 2021

Overall instructions for the exam:

- Books, notes, mobile phones, as well as other electronic devices are not allowed during the exam. Breaking this rule may result in expulsion from the examination
- Complete your personal information before starting the exam.
- There is only one correct option for each question. Each correct answer adds 0.3 points. Each incorrect answer substracts 0.1 points. Unanswered questions do not add or subtract points.

Question 1

What does this method on a linked list like the ones we have programmed in class, where first is the reference to the first node in the list.

```
public void method(){
    if(first != null){
        Node aux = first;
        while(aux.getNext()!=null){
            aux = aux.getNext();
        }
        System.out.println(aux.getInfo());
    }
}
```

Select one:

- a. Prints the second-to-last element on the list.
- b. Prints the first element of the list.
- c. Prints all the elements on the list.
- d. Prints the last element on the list.

Question 2

Given an empty stack, what does the call to top() return after the next sequence of method calls are executed: push(5); top(); pop(); push(2); push(3); pop(); pop();

Select one:

- a. 3
- b. null or an exception would be thrown because the stack is empty.
- c. 2
- d. 5

Question 3

Given a non-empty linked list that stores objects of type Integer, and that contains more than one element, if the method m is called, which node does current point to after exiting the while loop?

```
public void m() {
    Node current = this.first;
    while(current != null) {
        current = current.getNext();
    }
}
```

Select one:

- a. To the first node on the list.
- b. To no node (i.e. null).
- c. To the second-to-last node on the list.
- d. To the last node on the list.

Question 4

In a deque (double-ended queue), which of the following statements is correct?

Select one:

- a. With its -insertLast()- and -removeFirst()- methods we are able to use the deque as a stack.
- b. With its -insertFirst()- and -removeFirst()- methods we are able to use the deque as a queue.
- c. For a more efficient implementation it should be programmed with an array
- d. For a more efficient implementation it should be programmed with a doubly linked list.

Question 5

If we insert one by one the elements of the following array (3,1,2,5,7,4,6) in a binary search tree, which node would be the left child of the node whose value is 5 after finishing the insertion process?

Select one:

- a. 2
- b. 4
- c. 6
- d. null

Question 6

Given the binary tree of objects of type -Integer-, represented by the following array, and considering that these objects act as the key, is this binary tree a heap?

```
{15, 27, 41, 32, 59, 63, 95, 80, 77, null, null, null, null, null, null}
```

Select one:

- a. Yes; it is a min-heap.
- b. No; it is not a heap because it is not complete.
- c. Yes; it is a max-heap.
- d. No; it is not a heap since it does not meet the criteria to be either min-heap or max-heap.

Question 7

Given the binary tree represented by the array {A, B, C, D, E, F}, what would be the result of traversing this tree in post-order?

Select one:

- a. D, E, B, A, C, F.
- b. A, B, D, E, C, F.
- c. D, E, B, F, C, A.
- d. B, D, E, C, F, A.

Question 8

Given a min-heap represented by the array {"a", "d", "f", "e", "g"} and using objects of type String as both the info and the key, what would be the content of the array that represents the heap after executing the following operations: insert("c"); extract();, considering that extract() extracts the root of the min-heap.

Select one:

- a. "c", "d", "f", "e", "g"
- b. "a", "d", "c", "e", "g", "f"
- c. "f", "d", "c", "e", "g"
- d. "d", "e", "c", "f", "g"

Question 9

Regarding the efficiency of the search algorithms studied in class (linear and binary), taking into account that N is the number of elements, which of the following sentenes is correct?

Select one:

- a. The linear search is more efficient than the binary search for large values of N.
- b. The binary search has a complextiy of O(N).
- c. The binary search is more efficient than the linear search for large values of N.
- d. The linear search has a complexity of O(logN).

Question 10

How many swaps does the Bubble Sort algorithm needs to sort this array of integers from the lowest to the highest?

```
{45, 22, 39, 12}
```

Select one:

- a. 2
- b. 4
- c. 5
- d. 3

ANSWER KEY

1	2	3	4	5	6	7	8	9	10
D	B	B	D	B	A	C	A	C	C