uc3m

FIRST NAME:
LAST NAME:
NIA:
GROUP:

Ordinary Call

First Part: Test (3 points out of 10)

Duration: 30 minutes
Highest score possible: 3 points
Date: May 28, 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 0.2 points. Each incorrect answer substracts 0.066 points. Unanswered questions do not add or subtract points.

Question 1

If the following method receives an array with values 1,2,4,5,6,0,3 what does this method return?

```java
public static int method(int[] data) {
    int a = 0;
    if(data.length>=1){
        int b = data[0];
        for (int i=1; i < data.length; i++){
            if (b > data[i]){
                a = i;
                b = data[i];
            }
        }
    }
    return a;
}
```

Select one:
- a. 6
- b. 5
- c. 0
- d. An ArrayIndexOutOfBoundsException is thrown

Question 2

Given the following statement for the creation of an array, which of the following sentences is correct?

```
Object[] objects = {new String("exam"), new Integer(2021), new Boolean(true)};
```

Select one:

○ a. This is a case of downcasting.

○ b. The creation of the objects of classes Integer and Boolean is not correct.

○ c. The statement is correct.

○ d. The array objects cannot store instances of classes other than Object.

Question 3

Method overloading consists of:

Select one:

○ a. Programming in a class methods with the same name, same number and type of parameters but different return types.

○ b. Using class references to point to objects in classes that inherit from another class.

○ c. Programming in a class methods with the same name, but that receive a different number or type of parameters

○ d. Replacing an inherited method by another one with the same name in the subclass.

Question 4

Given the following class and interface declarations, which of the following assignments would cause a compilation error?

```
public interface Identifiable{...}
public class Person implements Identifiable{...}
public class Student extends Person{...}
public class Intern extends Student{...}
```

Select one:

○ a. Identifiable i = new Intern();

○ b. Student s = new Identifiable();

○ c. Identifiable i = new Person();

○ d. Person p = new Intern();

Question 5

The final modifier applied to a method...

Select one:

○ a. The final modifier cannot be applied to methods.

○ b. indicates that the method uses constants.

○ c. indicates that the method cannot be overriden.

○ d. indicates that the return value of the method is a constant.

Question 6

A static attribute...

Select one:

○ a. exists only once for all the instances of the class where the attribute is defined.

○ b. indicates that the attribute can only be accessed from the same class and its derived classes.

○ c. means that the attribute is a constant and its value cannot be changed while the program is being executed.

○ d. must always be called with this.attributeName.

Question 7

We are given a method that calculates the area of a square for a given side received as parameter. We want to do black box tests on this method. Select the set of values that allow us to test all the equivalence classes and boundary values for this method.

Select one:

○ a. -5, 0, 5

○ b. 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

○ c. 0, 0.5, 1

○ d. -1, 1, 2, 3

Question 8

Given the following recursive method:

```java
public static int m(int x, int y) {
    if (x<=1) {
        return y;
    }
    else {
        return m(x-1, x + m(x-2,y));
    }
}
```

Select one:

- a. It is not a recursive method.
- b. It is a nested recursion.
- c. It is a linear non-tail recursion.
- d. It is a mutual recursion.

Question 9

Given the following recursive method, which statament is correct if this method is called with n equals to 4 and m equals to 3.

```java
public static int method(int n, int m){
    if(n < m){
        return 3;
    }else{
        return 2*method(n--, ++m);
    }
}
```

Select one:

- a. The call to method(4,3) returns 6 as result.
- b. The call to method(4,3) leads to a StackOverflowError
- c. The call to method(4,3) returns 12 as result.
- d. This is a case of linear non-tail recursion.

Question 10

Given an empty queue implemented through a linked list, and in which these elements are inserted one by one in the order indicated 3,4,8,2,1,7,9, what would the call to the next method return considering that head points to the first node to be extracted from the queue?

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

Select one:

○   a. 9

○   b. A NullPointerException will be thrown

○   c. 7

○   d. 3

Question 11

We have the next set of statements:

```
Stack stack = new Stack();
Queue queue = new Queue();
stack.push("A");
stack.push("B");
stack.push("C");
queue.enqueue(stack.pop());
queue.enqueue(stack.pop());
stack.push("D");
queue.enqueue(stack.pop());
queue.enqueue(stack.pop());
```

Going from the first element to be dequeued to the last element to be dequeued, what does the queue contain after executing the above mentioned set of stataments?

Select one:

○ a. The queue is empty

○ b. C,B,A,D

○ c. A,B,C,D

○ d. C,B,D,A

Question 12

We run a travel agency (agency) located in London (UK) and we create a binary search tree to organize the possible destinations, where the first parameter of the method that inserts is the destination (information) and the second the distance to London in kilometers (used as the key). What is the result of calling agency.printInOrder() after running the following statements?

```
agency.insert("Madrid", 1262);
agency.insert("Rome", 1435);
agency.insert("Paris", 243);
agency.insert("New York", 5510);
agency.insert("Cape Town", 9607);
agency.insert("Amsterdam", 357);
agency.insert("Vienna", 1235);
agency.insert("Tehran", 4398);
```

Select one:

○ a. Madrid, Paris, Amsterdam, Vienna, Rome, New York, Tehran, Cape Town

○ b. Madrid, Paris, Rome, Amsterdam, New York, Vienna, Tehran, Cape Town

○ c. Paris, Amsterdam, Vienna, Madrid, Rome, Tehran, New York, Cape Town

○ d. Vienna, Amsterdam, Paris, Tehran, Madrid, Rome, Cape Town, New York

Question 13

Which of the following statements is TRUE?

Select one:

○   a. The number of comparisons to search for an element in a binary search tree depends directly on the depth of the node containing the desired information.

○   b. All sub-trees of a binary search tree are heaps.

○   c. All the sub-trees of a heap are binary search trees.

○   d. For a heap to be considered complete it must have all levels filled to their capacity.

Question 14

How many swaps does the Bubble Sort algorithm needs to sort this array of String from the lowest to the highest (that is in alphabetical order)?

```
{"Denmark", "Bulgaria", "Croatia", "Estonia", "Austria", "France", "Germany", "Italy", "Hungary"}
```

Select one:

○   a. 9

○   b. 7

○   c. 8

○   d. 10

Question 15

How many iterations are need with Linear Search and with Binary Search to find out that the value 13 is not in the following array?

```
{-10, -4, 0, 3, 5, 8, 16}
```

Select one:

○   a. 6 with Linear Search and 4 with Binary Search

○   b. 7 with Linear Search and 3 with Binary Search

○   c. We cannot use Binary Search in this case as there are negative numbers

○   d. We cannot use Binary Search in this case as the array is not sorted

ANSWER KEY

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
B	C	C	B	C	A	A	B	C	B	D	C	A	B	B