EXAM 2 PROGRAMMING **COMPUTING ENGINEERING** **Leganés**	 Universidad Carlos III de Madrid	
Surname(s)	***Name***	
Signature	***NIA***	***Group***

READ THESE INSTRUCTIONS CAREFULLY BEFORE YOU BEGIN WITH THE EXAM:

- **Fill in all the sheets with a blue or black pen, both the personal information and the answers.**
- **Make sure that you have provided your NIA and the actual group you belong to.**
- **You have one hour to complete the exam.**
- **During the exam the only materials allowed on the table is the exam paper and the pen.**
- **Use only the exam sheets for your answers. Any additional papers will not be collected.**

Part 1: Questions

Question 1 (1 mark).- Indicate whether the following statement is correct, and briefly explain why.

"A class always has at least one constructor."

True, if no constructor is declared by the programmer Java introduces a default one.

Question 2 (1 mark).- Indicate whether the following statement is correct and briefly explain why.

"The length of the string "Hola\n" is 6"

False, the length of the string is five. The escape sequence is counted as a single character.

Question 3 (1 mark).- What is the result of the following code, and why.

```
public class Main {
	public static void main (String [] args) {
		Counter n1 = new Counter ();
		Counter n2 = new Counter ();
		n2.print ();
	}
}

class Counter {
	private static int c = 2;
	public Counter () {
		c += 1;
	}

	public void print () {
		System.out.println ("Result: " + c);
	}
}
```

The result is 4 due to variable 'c' being declared as static.

Question 4 (1 mark).- Find the errors in the following code and suggest a way of resolving them.

```
public class Main {

	public static void main (String [] args) {
		Question n1 = new Question (1,'c');
	}
}

class Question {
	int a = 0;
	static char c;

	public Question (int a, char c) {
		this.a = a;
		Question.c = c;
	}

	public void Question (char c, int a) {
		this.a = a;
		this.c = c;
	}
}
```

There are no errors in the above code.

Question 5 (1 mark).- What is the purpose of a constructor?

The constructor is the very first method executed upon object creation. Usually it is used to initialise some of the object's attributes.

Question 6 (1 mark).- What does the term “method overloading” describe?

Java allows for several methods being given the same name. Those methods are then distinguished by the type and number of their arguments. We refer to this language characteristic as method overloading.

Question 7 (1 mark).- How are arguments passed to methods? What is the value of x after executing the following code?

```
public class Main {

	public static void main (String [] args) {
		Question n1 = new Question ();
		int x = 0;
		n1.increment (x);
	}
}

class Question {
	public void increment (int n) {
		n += 1;
	}
}
```

Arguments are passed to methods by value. That means a copy of the value of a variable is made when that variable is passed as an argument to some method call. Hence the value of x above remains zero.

Question 8 (1 mark).- What is the difference between a variable defined as “static final” and a variable defined as “final”?

```
public class Main {

	public static void main (String [] args) {
		Question q = new Question ();
	}
}

class Question {
	static final int x = 0;
	final int y = 0;
}
```

Firstly, both variables are constants as they are declared final. However, the variable declared as static final is common to all the objects of the class.

PART 2: PROBLEMS

Problem 1 (2 marks).- Write a function which given an array of characters should return an array of characters containing the characters of the first in reverse order. For example

```
Inverse q = new Inverse ();
char [] c = {'a', 'b', 'c', 'd'};
char [] i = q.inverse (c);
```

The value of *i* should be: {'d', 'c', 'b', 'a'}.

```
public char [] inverse (char [] l) {
  char [] result = new char [l.length];
  for (int i = 1; i <= l.length; i++) {
      result[(l.length) - i] = l[i-1];
  }
  return result;
}
```