TEST 1 PROGRAMMING **November 2008** **COMPUTER ENGINEERING**	 Universidad Carlos III de Madrid

READ THESE INSTRUCTIONS CAREFULLY BEFORE YOU BEGIN WITH THE TEST:

- **Fill all the sheets with a pen, both the personal data and the answers**
- **Do not use a red pen or a pencil**
- **Please fill in your NIA and the actual group in which you belong**
- **The exam should be answered in one hour**
- **The only material allowed on the table are the test and a pen**
- **Use only the sheets of the test to write your answers (you may use the rear side of the sheets if required). Any additional papers will not be collected.**

DO NOT GO BEYOND THIS SHEET, until you are told to do so

Last names	***Name***	
Signature	***NIA***	***Group***

PART 1: QUESTIONS

Question 1 (1 Mark).- What is the difference between the boolean & and &&? *When should we choose && over &?*

Both are logical AND operators (or conjunctions). When & is used both of the operands are evaluated. When && is used the second operand is not evaluated when the first is false. This is due to the fact that a conjunction holds when both operands are true. Hence the result is immediately known when the first operand evaluates to false.

We should choose && over & when the second expression depends on the first. For instance, in the following example the second expression of the if statement divides 1 with *a*, hence we first check whether *a* has a value different than zero and perform the division only when that is the case.

```
public static void main (String [] args) {
      int a = 0;
      if ((a != 0) && (1/a > 0)) { }
}
```

Question 2 (1 Mark).- Please specify whether the following statement is correct and briefly explain why.
"The value of a constant variable can change as long as the variable is globally declared"

A variable declared as a constant (with the keyword *final*) cannot have its value changed regardless of the scope in which it is declared, including the variables that are globally visible. Hence the above statement is incorrect.

Question 3 (1 Mark).- Please specify whether the following statement is correct and briefly explain why.
"The expression of a switch conditional should always evaluate to an integer."

The above statement is true. The expression of a switch statement should always evaluate to an integer and its compatible types: integer, byte, short, char.

Question 4 (1 Punto).- Please correct the following code.

```
public class Main {
	public static void main(String args) {
		int a c = 0;
		float f = 2f;
		a = f;
		char c == 'c';
		String s = a;

		return 1;
	}
}
```

A possible solution is the following:

```
public class Main {
	public static void main(String[] args) {
		int a,c = 0;
		float f = 2f;
		a = (int)f;
		char d = 'c';
		String s = "" + a;
	}
}
```

Question 5 (1 Mark).- What is the value of the variable named "res" in each of the following cases?

```
a) int a = 1, b = 2; float res = (float) ((a++) + b) / 2;
b) boolean a = false, b = false; boolean res = a || (!b);
c) int c = 0; boolean res = c == 0? false: true;
d) boolean [] c = {true,false}; float f = 1f; boolean res = c[(int)f - 1];
```

a) res = 1.5
b) res = true
c) res = false
d) res = true

Question 6 (1 Mark).- For each of the following declarations please explain which is correct and which not. In case that is not correct please suggest a correction (if possible) that does not alter the type of the variables.

a) `int a= 300; byte b = a;`

b) `float a = 4; double b = a / 0;`

c) `char b = a; float a = 90;`

d) `char a = ‘g’, b = a+1;`

Possible solutions are the following.

a) `int a = 25; byte b = (byte) a;`

b) `correct (Infinity)`

c) `float a = 90; char b = (char) a;`

d) `char a = 'g', b = (char) (a + 1);`

PART 2: PROBLEMS

Problem 1 (2 Marks).- The campus of Leganés has three car parks namely (a) of 28 positions, (b) of 12 and (c) of 20. Once a slot is reserved it is assigned the registration number of the car allowed to park in that slot. Formulate the above into an array and populate it with the following data:

- Slot 2 in car park (a) is reserved by “1832AAZ”
- Slot 9 in car park (b) is reserved by “1111KKK”

A possible solution is the following.

```
public class Main {
      public static void main(String[] args) {
            String [][] car_parks = new String [3][];
            car_parks[0] = new String [28];
            car_parks[1] = new String [12];
            car_parks[2] = new String [20];

            car_parks[0][1] = "1832AAZ";
            car_parks[1][8] = "1111kkk";
      }
}
```

Problem 2 (2 Marks).- Create an array of 2000 positions of type *boolean* and populate it in the following manner:

- The slots at an even position should be given the value *false*.
- The slots at an odd position should be given the value *true*.

A possible solution is the following.

```
public class Main {
	public static void main(String[] args) {
		boolean [] bools = new boolean [2000];

		for (int i = 0; i < 2000; i++) {
			if (0 == i%2) bools[i] = false;
			else bools[i] = true;
		}
	}
}
```