Programming – Mid-semester Exam October 24th, 2017	 Universidad Carlos III de Madrid
Bachelor's degree in Computer Science and Engineering	

READ **CAREFULLY** THESE INSTRUCTIONS BEFORE STARTING THE EXAM:

- Do not answer on this sheet, use the provided ones
- Fill in all the pages with a **pen** (personal data and answers)
- Do not use a pencil or a red pen
- Problems can be solved in any order, but if so, use a new sheet for each problem and put them in the right order at the end
- Do not forget to include your name and your group on every page
- Ask the professor before using any Java library. As a general rule, libraries not seen during the course are forbidden.
- The duration of this exam is **1 hour and 40 minutes**

Problem 1 (2 Points).- Create the **flow diagram** of a program that generates a random price for an item in the range 5 to 100€. After that it will ask the user about a payment method: cash or credit card. Payments with credit card are only possible if the price is over 10€. If the user chooses credit card, the payment is directly accepted and the program ends. If paying with cash only a single 5€, 20€, 50€ or 100€ note is accepted. The user will enter one of these notes and the program must check that the money is enough to pay the item and that the note is not bigger than two times the price of the item. It will keep asking until the user enters a correct note (see below for an example of execution).

Problem 2 (2 Points).- Create a Java program implementing the former flow diagram. Example of execution:

```
The price of the item is 37€
Do you want to pay with cash (true/false)?
true
Enter the bill you will use to pay
15
No such bill!
Enter the bill you will use to pay
100
You cannot pay 37€ with 100€
Enter the bill you will use to pay
50
Thanks for buying!
```

Problem 3 (6 points).- A wood workshop sells wood boards of 10 different sizes, which they call size 0, size 1, etc. Create a program that:

- Generates 10 random numbers, between 0 and 10, one for each available board size.
- Prints the number of boards of each size in the stock of the warehouse.
- Asks the user about the number of customers that will buy boards. It will keep asking while it is smaller than 1.

- Automatically generates an order for each of the customers. Each order will contain for each available size a random number of boards between 0 and 4.
- Prints the orders into the screen.
- Sells boards to the customers, starting by the first one, reducing the number of boards in the stock.
- Prints the pending orders for each customer. A pending order is the number of boards of each size that cannot be sold as there are not enough boards in stock.

Example:

```
Stock:       size0 size1 size2 size3 size4 size5 size6 size7 size8 size9
             1     6     4     5     5     8     1     8     7     2
Enter the number of customers, please
3
Original orders
Customer 0:  3     3     1     0     3     0     2     3     3     3
Customer 1:  0     3     3     1     1     0     1     1     3     3
Customer 2:  2     3     0     1     0     2     0     0     0     3

Pending orders
Customer 0:  2     0     0     0     0     0     1     0     0     1
Customer 1:  0     0     0     0     0     0     1     0     0     3
Customer 2:  2     3     0     0     0     0     0     0     0     3
```