

## ITEC1620: Object-Based Programming

### Assignment 3

#### Assignment instructions. Please READ CAREFULLY.

- a- The due date for this assignment is **Nov. 28, 2020** ~~Nov. 25, 2020~~, at 11:59 pm (firm date). **No LATE SUBMISSIONS** are accepted.
- b- You need to submit your assignments to eClass. You should only submit .java or /txt files (**NO OTHER FORMAT IS ACCEPTED**). You need to use Eclipse IDE for the assignment. If you have any issues, please let your TA know; otherwise, you will not get any mark on the assignment if it is not submitted on eClass and by the due date.
- c- In each program, add at the beginning **a comment** with your name and student number.
- d- You need to add comments to your code to explain your solution steps in each question. Do not add unnecessary comments.

#### Questions

- 1- Write a code for a banking program.
  - a) In this question, first, you need to create a Customer class, this class should have:
    - 2 private attributes: name (String) and balance (double)
    - Parametrized constructor to initialize the attributes
    - Methods:
      - i. public String toString() that gives back the name and balance
      - ii. public void addPercentage; this method will take a percentage value and add it to the balance
  - b) Second, you will create a driver class and ask the user to enter 6 customers' information and then you will create an array of Customer objects.
  - c) Then you use this array used for various operations as shown in the output.
    - Using the array of customer objects, you need to search for all customers who have less than \$150
    - Using the array of customer objects, you need to get the average balance of the balances in this array
    - Using the array of customer objects, you need to get the customer with the highest balance and lowest balance
    - Using the array of customer objects, you need to show all accounts after a 15% balance increase

**You need to use loop/conditionals otherwise you will lose marks. Don't hardcode the output otherwise marks will be deducted.**

**If the class variables are not private, you will lose marks.**

**The output should be as follow (note: user input is required):**

For 6 customers enter the name and in the next line the balance

Sam  
69.8  
Mary  
225  
Mark  
189.5  
Ana  
34.5  
Johnny  
446.7  
Jessy  
88.6

Search for all customers who have less than \$150

Sam  
Ana  
Jessy

The average balance is: 175.68333333333333

The customer with the highest balance is: Johnny

The customer with the lowest balance is: Ana

Show all accounts after a 15% balance increase

Sam has \$80.27  
Mary has \$258.75  
Mark has \$217.925  
Ana has \$39.675  
Johnny has \$513.7049999999999  
Jessy has \$101.88999999999999

- 2- Write a program to place eight queens on 10 x 10 chessboard in such a way that one queen is to be in each row. A program will use 2 DIMENSIONAL array  $x[r][c]$  to do this configuration. If  $x[r]$  has value  $c$ , then in row  $r$  there is a queen in column  $c$ . Write a program that asks a user to enter the columns that contain queens in the 8 rows. The program then places the queens in these columns (one per row) and prints the board. For example, if the user enters: 0,3,2,0,0,7,6,7 for 8x8 board, this means in the first row, the queen will be placed in the first column, in the second row, the queen will be placed on the fourth column, in the third row, the queen will be placed on the third column and so on. So, based on the above user input, the output will be

```
Q . . . . . . .
. . . Q . . . .
. . Q . . . . .
Q . . . . . . .
Q . . . . . . .
. . . . . . Q
. . . . . Q .
. . . . . . Q
```

For this code, the user will input the following: 1, 0, 7, 7, 0, 3, 2, 6, 8, 4

Loop and conditionals should be used otherwise marks will be deducted. Don't hardcode the output otherwise marks will be deducted.

The output should be as follow (note: user input is required):

```
Please enter columns to put queen
1
Please enter columns to put queen
0
Please enter columns to put queen
7
Please enter columns to put queen
7
Please enter columns to put queen
0
Please enter columns to put queen
3
Please enter columns to put queen
2
Please enter columns to put queen
6
Please enter columns to put queen
8
Please enter columns to put queen
4
. Q . . . . . . . .
Q . . . . . . . .
. . . . . . Q . .
. . . . . . Q . .
Q . . . . . . . .
. . . Q . . . . .
. . Q . . . . . .
. . . . . . Q . .
. . . . . . . Q .
. . . . Q . . . .
```

- 3- Write a Java code that read 8 positive integers from the user and store them in an array. The program should ensure that the numbers of the array are positive. If not, the program will keep asking user to enter positive values. Then, it finds the position (or index) of the maximum and minimum values in the array, and swap them (move the max element to the position of the min, and move the min element to the position of the max). Then it calculates the median of the elements of this array (for this step an ascending order sort should be done before calculating the median). Then run the code again for integer array of size 7.

Loop and conditionals should be used otherwise marks will be deducted. Don't hardcode the output otherwise marks will be deducted.

**The output of array of size 8 should be as follow (note: user input is required):**

```
The array length is: 8

Please enter value for the array:
4
Please enter value for the array:
-2
Please enter a positive value:
55
Please enter value for the array:
67
Please enter value for the array:
-56
Please enter a positive value:
122
Please enter value for the array:
98
Please enter value for the array:
1
Please enter value for the array:
4
Please enter value for the array:
12

Before swapping the min max, the array is
4 55 67 122 98 1 4 12

The max is 122 and its location is 3
The min is 1 and its location is 5

After swapping the min max, the array is
4 55 67 1 98 122 4 12

The array sorted in Ascending Order: 1 4 4 12 55 67 98 122

The median is: 33.5
```

**The output of array of size 7 should be as follow (note: user input is required):**

```
The array length is: 7

Please enter value for the array:
3
Please enter value for the array:
44
Please enter value for the array:
-1
Please enter a positive value:
78
Please enter value for the array:
12
Please enter value for the array:
81
Please enter value for the array:
123
Please enter value for the array:
97

Before swapping the min max, the array is
3 44 78 12 81 123 97

The max is 123 and its location is 5
The min is 3 and its location is 0

After swapping the min max, the array is
123 44 78 12 81 3 97

The array sorted in Ascending Order: 3 12 44 78 81 97 123

The median is: 78.0
```

**Good luck!**