LAB 1: CMPS347

Beirut Arab University **Faculty of Science** **Mathematics and Computer Science Department** **Lab Sheet # 1**	**Course: Data Structure** **Semester: Fall 2024-2025** **Instructor: Dr. Ali El-Zaart, and Dr. Mahmoud Skafi**

Question 1:

Write a java program that implements the class ArrayInt according to the following UML class.

ArrayInt
− **a: int[]**   − **currentNb: int**
+ **ArrayInt(size: int)**   + **isEmpty(): boolean**   + **isFull() : boolean**   + **InsertElementAtFront(value: int): void**   + **InsertElementAtBack(value: int): void**   + **InsertElementAtPosition(position: int, value: int): void**   + **Display(): void**   + **SearchValue(value : int): int**   + **DeleteElement(value : int): boolean**   + **AverageofEvenNb():double**   + **MultiplesOfEvenThree(): void**   + **OccurrenceNb(number : int): int**   + **Palindrome(): Boolean**   + **OddElementArray(): int[]**   + **FindSecondMaximum(): int**   + **EvenOrOdd(): Boolean**   + **SortArrayDesc(): void**   + **DeleteMultipleOfOddThree(): void**

Attributes of class **ArrayInt**

- **a**: an array where numbers are placed

- **currentNb:** number of elements in the array

Methods of class **ArrayInt:**

- **ArrayInt():** constructor that initializes the class attributes
- **isEmpty():** returns true if the array is empty and false otherwise
- **isFull():** returns true if the array is full and false otherwise
- **InsertAtFront(int):** adds an element at the front of the array
- **InsertAtPosition(int,int):** adds an element at a certain position
- **InsertAtBack(int):** adds an element at back of the array
- **Display():** prints the elements of the array
- **SearchValue(int):** returns the index of an element if found, else it returns -1
- **DeleteElement(int):** deletes an element from the array if found then returns true, else it returns false
- **AverageofEvenNb():** returns the average of even elements.

- **MultiplesOfEvenThree():** prints *even* elements that are considered *multiples of 3*
- **OccurrenceNb(int):** returns the number of occurrences of certain number

6	7	7	1

Occurrence of 7 is 2

- **Palindrome**(): returns true if the elements of array are symmetric otherwise false

Palindrome

1	2	2	1

- **OddElementArray():** returns an array containing odd numbers

- **FindSecondMaximum()** returns the second maximum number in the array

- **EvenOrOdd()** returns true if the number of even numbers greater the number of odd numbers otherwise false.

- **SortArrayDesc()** sorts the array elements in an descending order

- **DeleteMultipleofOddThree**(): deletes elements that are considered to *be odd and multiples of three*

Write the main program to test all methods of the class ArrayInt

Question 2:

Write and test a java class that uses an array of *GymSubscriber objects* that stores gym subscribers information in the computer.

There will be no *more than 50 subscribers* in the directory.

Each subscriber entry will contain a *name*, *phone number*, *ID Card*, and *gender*.

Your class should provide methods to:

- **addSubscriber():** checks the directory, if there is enough space, it adds a gym subscriber entry to that directory.
- **searchByName():** lets you find gym subscribers by their name. After you input the name you are searching for, all entries with *exact* same name will be displayed.
- **searchByIdCard():** lets you find gym subscribers by their ID Card. After you input the ID Card you are searching for, all entries with *exact* same ID Card will be displayed.
- **printSubscriberList():** prints the entire list of gym subscribers in the directory.