Fundamentals of Programming 2
Exercise sheet 2 - 5%

***** READ THE QUESTIONS CAREFULLY *****
***** NAME YOUR FILE ProcessArray.java *****
***** SUBMIT NEAT, TIDY AND INDENTED CODE *****
***** DOCUMENT YOUR CODE *****

Question 1

Write a Java program called **ProcessArray.java** that implements **static methods** to carry out the following:

1. A **function** called **makeRandomArray** that creates and **returns** an integer array of a given size with values between a lower and upper bound *(see slide 17 of the lecture notes)*.
2. A **procedure** called **printArray** that prints any given array to screen. Each array value should be separated by a space " " *(see slide 15 of the lecture notes)*.
3. A **function** called **sumArray** that **returns** the sum of any given integer array *(see slide 16 of the lecture notes)*.
4. A **function** called **averageArray** that calculates and **returns** the average value of any given integer array. ***NOTE:*** *See if you can reuse any of your existing static methods as part of your solution.*
5. A **function** called **frequency** that calculates and **returns** the count of a given integer value for any given integer array.
6. A **procedure** called **zeroArray** that sets the values of any given integer array to zero.

The method signatures for parts 1, 2 and 3 are given below:

```
// Method to create an integer array
public static int[] makeRandomArray(int size, int upper, int lower)
// Method to print an integer array
public static void printArray(int[] array)
// Method to sum all values of an integer array
public static int sumArray(int[] array)
```

Your main() method should look like this

```java
// Main method
public static void main(String[] args) {
    // Declare an empty array
    int[] myData;
    // Create the array
    myData = makeRandomArray(200, 100, 1);
    // Print array
    printArray(myData);
    // Sum the array
    System.out.printf("Array sum %d\n", sumArray(myData));
    // Average the array
    System.out.printf("Array average %f\n", averageArray(myData));
    // Find frequency of 10
    System.out.printf("Frequency of 10 is %d\n", frequency(10, myData));
    // Zero the array
    zeroArray(myData);
    // Print array
    printArray(myData);
}
```

Your program output should look similar to this

```
75 19 37 98 88 43 10 78 85 22 15 7 79 38 70 6 61 71 52 95 22 94 34 22 21 5
0 79 24 77 56 30 41 46 10 89 58 90 19 7 32 14 66 76 72 34 13 52 13 48 6 71
 92 13 56 63 47 3 92 72 11 13 33 99 68 25 22 99 30 2 99 28 23 75 56 37 30
21 27 79 99 11 33 34 51 30 14 47 9 35 32 74 37 87 53 10 98 90 47 43 91 85
12 57 50 40 93 47 32 64 68 47 70 58 51 64 53 77 28 30 76 42 23 38 25 90 88
 8 54 99 50 30 91 28 42 33 15 83 36 5 49 90 32 42 96 70 41 10 14 26 99 86
82 10 70 70 14 26 85 17 28 96 68 15 53 59 81 25 16 30 75 3 51 86 39 41 98
68 24 17 47 7 74 55 73 95 75 40 8 36 48 3 17 56 27 34 2 14 85 30 70
Array sum 9635
Array average 48.175000
Frequency of 10 is 5
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

<u>Deliverables</u>

Place all your Java source files in a folder called **Week2**. Zip the Week2 folder and upload the zip file using the Week2 upload link for your group on MOODLE.

<u>All work must be submitted during your scheduled practical sessions.</u>

<u>Plagiarism</u>

This assessment should be an individual piece of work. Any evidence of plagiarism will result in a grade of zero for all parties involved and will trigger the Universities plagiarism policy **<u>3AS08</u>** (see course coordination page).