Quiz 1

Subject: Control and Loop Statements, Arrays, Functions

Due Date: 19.02.2022 23:59

Introduction

In this experiment, you are going to practice on control and loop statements, arrays and functions of Java.

1 Experiment

You are expected to develop a program that performs some mathematical operations. These operations are;

- Calculating Armstrong numbers
- Generating number sequences in either ascending or descending order.

1.1 Calculating Armstrong numbers

An n-digit number is an Armstrong number if the sum of the nth power of the digits is equal to the original number. Here are some example Armstrong numbers;

$$153 = 1^3 + 5^3 + 3^3$$
$$370 = 3^3 + 7^3 + 0^3$$
$$1634 = 1^4 + 6^4 + 3^4 + 4^4$$
$$54748 = 5^5 + 4^5 + 7^5 + 4^5 + 8^5$$

By the selection of this operation from input file, your program is going to get an input value from the file and list all Armstrong numbers up to that value.

1.2 Sorting

If the sorting command comes, an array of integers is going to be generated from numbers that will be given by the file. The array is going to be in either ascending or descending order according to command in the file.

The commands for sorting will be like "Ascending order sorting" or "Descending order sorting". While the each number comes from the file, new element is going to be inserted to true position of the array according to command type and the number sequence will be printed. -1 means the array generation is finished.

1.3 Exit

If the command is "Exit", the program will terminate.

2   Grading Policy

- Your work will be graded over a maximum of 100 points.

- Your total score will be partial according to the grading policy stated below.

Compiled	10p
Taking input file as arguments from command line and correct output	90p

3   Execution and Test

- Upload your java files to your server account (dev.cs.hacettepe.edu.tr)

- Compile your code (javac *.java)

- Run your program (java Main operation.txt output.txt)

- Control your output

You will read all the commands from the file and create an output.txt as output.

```
Calculating Armstrong numbers
5000
Ascending order sorting
1
3
2
-1
Descending order sorting
10
30
15
100
25
-1
Exit
```

Figure 1: General behavior of the program

```
Calculating Armstrong numbers
153 370 371 407 1634
Ascending order sorting
1
1 3
1 2 3
Descending order sorting
10
30 10
30 15 10
100 30 15 10
100 30 25 15 10
Terminated..
```

Figure 2: Output of the program

4   Notes

- Do not miss the submission deadline.

- Save all your work until the quiz is graded.

- You can ask your questions via Piazza and you are supposed to be aware of everything discussed on Piazza.

- You must submit your work with the file hierarchy as stated below:

  ⟨*studentid*⟩*.zip*

          - (Main.java)

          - (*.java)