A5 (30 marks)

***Focus**: loops (while, do-while, for) , String and Character classes*

Q1. [7 marks] Write a program that allows a user to enter a number of integers until the user inputs 0 (zero). The program then prints the total number of positive, negative, even and odd integers that have been entered. Your program should also print the sum and average of the input values (not counting zeros). The average should be rounded to 2 decimal places.

Sample run

```
Enter the first integer (0 to terminate): 0
no numbers are entered except 0
```

```
Enter the first integer (0 to terminate): 3
Enter the next integer (0 to terminate): 1
Enter the next integer (0 to terminate): 6
Enter the next integer (0 to terminate): 0
The number of positives is 3
The number of negatives is 0
The number of evens is 1
The number of odds is 2
The total is 10
The average is 3.33
```

Q2. [7 marks] If a number is equal to the sum of all of its positive divisors, excluding itself, then it is called a perfect number. For example, 6 = 3+2+1 and hence, 6 is the first perfect number. 28 is the next perfect number as 28 = 14+7+4+2+1. There are 4 perfect numbers between 1 and 10,000. Write a program to find those 4 numbers.

Q3. [8 marks] Write a program to find all the numbers between 100 and 200 that are divisible by either 5 or 6 but not both (this is called XOR relationship). Your program must display 10 numbers per line with exactly one space between each 2 numbers.

Hints:

- Use the XOR operator.
- To display 10 numbers per line, you need to use a counter that is incremented whenever a number is displayed. A new line is taken whenever the counter is equal to 10.

Sample run

```
100 102 105 108 110 114 115 125 126 130
132 135 138 140 144 145 155 156 160 162
165 168 170 174 175 185 186 190 192 195
198 200
```

Q4. [8 marks] Write a program that first asks the user to input a number of students and then asks for each student's name and score. The program should then display the names of the highest scorer and the second-highest scorer. The validity of user's input is not needed to be checked.

Sample run

```
Enter the number of students: 4
Enter a student name: John
Enter a student score: 3.5
Enter a student name: Mike
Enter a student score: 2.5
Enter a student name: Lili
Enter a student score: 4
Enter a student name: Yasmine
Enter a student score: 3
Top two students:
Lili's score is 4.0
John's score is 3.5
```

Submission Instructions

For this assignment, you need to do the following:

1. Create a Java project of which name consists of **your student number followed by the assignment number,** e.g., "1234567_A1".
2. Create one class for each question and write your answer inside that class. Your classes should have the same name as the question number (e.g., Q1)
3. After solving all questions, open your file explorer.
4. Navigate to your Java project folder (can be found inside your Eclipse workspace folder).
5. Locate the "src" folder for this project (the folder that includes the source code for all questions).
6. Zip the "src" folder and rename the zipped file to match your project name (e.g., 1234567_A1.zip).
7. Submit the zipped file **to Canvas.**

Note that you can resubmit an assignment, but the new submission overwrites the old submission and receives a new timestamp.