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Introduction to Computer Programming, Spring Term 2023
Practice Assignment 4

Discussion: 18.03.2023 - 23.03.2023

Exercise 4-1 Stream of Numbers
To be discussed in Tutorials

Write a Java program to read a list of nonnegative integers and outputs the maximum integer, the minimum integer, and the average of all the integers. The end of the input is indicated by the user entering a negative number. Note that the negative number is not used in finding the maximum, minimum, or average. The output should be something like this:

```
Please enter a sequence of positive numbers
2
3
5
4
-1
The maximum number is : 5
The minimum number is: 2
The average is: 3.5
```

Use in one program a `while` loop and in another program a `do while` loop.

Exercise 4-2 Pyramid
To be discussed in Tutorials

Construct the following pyramid of numbers given that `n` is an odd input from the user. For example if `n=9`, the pyramid should look like the following:

```
    1
   123
  12345
 1234567
123456789
```

Exercise 4-3 Contains
To be discussed in Tutorials

Write a program that takes two strings `s1` and `s2` as inputs and checks whether string `s1` is a substring in string `s2`.

Example:

```
s1 = "abc"
s2 = "ababc"
Output: true
```

```
s1 = "a"
s2 = "ababc"
Output: true

s1 = "abc"
s2 = "ababa"
Output: false
```

Exercise 4-4 Run Length I
To be discussed in Tutorials

Write a Java program that reverses the compression of a iven string.

Example:

```
Input: 12W1B12W3B24W1B14W
Output: WWWWWWWWWWWWBWWWWWWWWWWWWBBBWWWWWWWWWWWWWWWWWWWWBWWWWWWWWWWWWWW
```

Exercise 4-5 Run Length II
To be solved in Labs

Given a String containing uppercase characters (A-Z), write a Java program that compresses repeated 'runs' of the same character by storing the length of that run.

Example:

```
Input: WWWWWWWWWWWWBWWWWWWWWWWWWBBBWWWWWWWWWWWWWWWWWWWWBWWWWWWWWWWWWWW
Output: 12W1B12W3B24W1B14W
```

Exercise 4-6 Midterm Spring 2013- Snake Eye
To be solved in the labs

The method `Math.random()` gives a real number between `0.0` and `0.9999...`, and so `6*Math.random()` is between `0.0` and `5.999...`. The type-cast operator, `(int)`, can be used to convert this to an integer: `(int)(6*Math.random())`. Thus, `(int)(6*Math.random())` is one of the integers 0, 1, 2, 3, 4, and 5. To get a number between 1 and 6, we can add 1:

```
(int)(6*Math.random()) + 1
```

Using the statement above, we would like to know how many times we have to roll a pair of dice before they come up snake eyes? **Note:** Snake eyes means that both dice show a value of 1. Write a method that should return the number of rolls that it makes before the pair of dice come up snake eyes. The method should also display the following message, e.g.:

```
It took 100 rolls to get snake eyes.
```

Note: You have to use a do-while loop.

Exercise 4-7 Square N
To be solved in Labs

Write a Java program to construct a square shape of numbers given that `n` is an input from the user. For example if `n=6`, the shape should look like the following:

```
* * * * * *
*         *
*         *
*         *
*         *
* * * * * *
```

Exercise 4-8 Divisors
To be solved in Labs

Which integer between 1 and 10000 has the largest number of divisors, and how many divisors does it have? Write a program to find the answers and print out the results. It is possible that several integers in this range have the same, maximum number of divisors. Your program has to print out one of them.

Exercise 4-9 Word Count

Write a program that reads a sentence and a word from the user and finds the number of occurrences of the given word in the sentence. For example, the following could be a run of your program

```
Enter the sentence:
the students are enjoying life at the GIU
Enter the word:
the
The sentence is "the students are enjoying life at the GIU".
The word "the" occurs 2 times in the sentence
```

Exercise 4-10 Number of Digits

Write a Java program that reads from the user positive integers and count the number of digits in them. The program should keep asking the user for entering integers until he/she enters -1. The output should be something like this:

```
Please enter a number
524
Number of digits in 524 = 3
Please enter a number
24
Number of digits in 24 = 2
Please enter a number
35790
Number of digits in 35790 = 5
Please enter a number
-1
Thank you!
```

Exercise 4-11 Extract Numbers

Write a Java program that takes a string containing text and non-negative numbers form the user and prints out the numbers contained in the string in separate lines. Use nested loops.

Running example

```
Please enter your string
The year has 365 days and the day has 12 hours
Output
```

```
The numbers contained in your string are
365
12
```