CPSC 1061 – Introduction to Programming in Java Lab

Spring 2021

Lab 7 – Due Monday, March 1^{st}, 10:00pm

1 Introduction and Lab Objectives

In this lab you will practice writing and using methods in Java programs. The objectives of this lab are to:

1. write methods with and without parameters
2. write methods with return values with different types
3. write methods that call other methods
4. use overloading methods
5. continue using previous concepts such as creating random numbers, working with Strings, and using if-statements and for-loops

The lab today has to be performed in groups of two. Do not just tell each other solutions but always make sure that your lab partner also understands why something does or does not work. Have fun!

2 Main

2.1 General Instructions

At the start of each program, write your name, the name of your lab partner, the course and lab, the date, and a description of what your program does as in the previous lab. In this lab as well as in all following labs, each program needs to have comments (not just at the beginning), to be clean, and to compile. Furthermore, any input and output should be designed to have appropriate instructions and sentences.

2.2 Initials2.java

Write a method that prints your initials in ASCII-art. Invoke it in the main method of your program. You can re-use your code from lab2 if you wish.

2.3 CircleArea.java

Write a method circleArea, which returns the area of a circle of radius r.

Invoke that method with r = 2.5, r = 7, and r = -2.

In the case of r = -2, the method needs to print a message that a radius can not be negative and return 0.0.

2.4 Overload.java

Write three methods, all called display.

The first one takes two parameters of type String and returns a String that is the concatenation of both input Strings.

The second one takes a parameter of type String and a parameter of type int and returns a String. The return String is the parameter of type String repeated n times (on the same line without any spaces) with n being the parameter of type int.

The third one takes a parameter of type char and a parameter of type int and returns a String. The return String is the parameter of type char repeated n times (on the same line without any spaces) with n being the parameter of type int.

In your main method, invoke each method.

2.5 Palindrome.java

Write a method named isPal that checks if a word is a palindrome and returns a boolean value based on the result. A palindrome is a word (or number or sentence, but for this program let's focus on words) that reads the same forward or reversed. Examples of palindromes are hannah or racecar. For simplicity, in this program, we will not count "Hannah" (capitalized) as being a palindrome.

In your main method, ask the user for a word. Invoke the method isPal to tell the user if the word is a palindrome or not.

2.6 Matrix.java

Write a program that displays an n-by-n matrix where each element is 0 or 1 (randomly chosen for each element) based on the following steps:

1. Write a method called r that randomly creates a 0 or a 1. Its header should look as follows: `public static int r()`

2. Write a method called line that creates a line of n numbers that are either 0 or 1. Its header should look as follows:
   `public static String line(int n)`
   Call the previous method in this method.

3. Write a method called matrix that prints an n-by-n matrix with numbers that are either 0 or 1. Call the previous method in this method. Its header should look as follows: `public static void matrix(int n)`

4. In the main method, ask the user for a number n, and invoke the matrix method to display an n-by-n matrix where each element is 0 or 1.

Example output:

```
Please enter the size of your matrix:
10
1 1 1 1 0 0 0 1 1 0
0 1 0 1 0 0 0 1 1 0
1 1 1 1 1 1 0 0 1 1
1 1 0 0 0 0 0 1 0 0
0 1 0 0 0 0 1 0 0 1
1 1 1 1 1 1 1 0 1 1
1 1 0 0 0 1 1 1 0 1
0 0 1 1 1 1 1 1 0 0
1 1 0 0 1 0 0 0 1 0
1 0 1 1 1 1 1 1 1 0
```

2.7 Submit Files

Make sure to test your java files on the lab machines. Create a single zip-file that includes all the java files (and no other files) and submit the zip-file to Canvas. Each program counts 2 point.