Software Development I – Exercises **Winter Term 2012/2013**

Übungen zu Softwareentwicklung 1 **Assignment 3**

Name: _____ Teaching Assistant: _____

Student ID (Matr.Nr.): _____ Points (max. 24): _____

Group: _____ Deadline: Wed, Nov. 14th, 2012 12:00 noon

Instructor: _____ Editing time: _____

Question 1: Telephone Number **12 points**

On the standard telephone, each digit from 2 through 9 is associated with a group of three or four letters as shown below. The numbers 0 and 1 are not associated with letters.

The table of numbers to letters is as follows:

ABC	2
DEF	3
GHI	4
JKL	5
MNO	6
PQRS	7
TUV	8
WXYZ	9

It is often easier to remember a telephone number if a word is associated with it. For example, BBC NEWS = 222 6397, and PROGRAM = 776 4726.

Write a Java program that takes as input a 7 character word and outputs the associated telephone number.

The program should prompt the user for 7 input characters and output 7 numbers as follows:
Input: `BBCNEWS`
Output: `2226397`

Input: `PROGRAM`
Output: `7764726`

a) Write the program in Java. Provide all the material requested below at the very bottom ("Requested material…")

Question 2: Triangle's Perimeter **12 points**

A triangle is defined by the x- and y-coordinates of its three corner points. Write a program that will compute the perimeter ("Umfang") of a given triangle. Assume the grid size is 40 x 40 and there can only be positive inputs for x and y.

Your program should have the following functionalities. Appropriate error messages should be displayed in case of invalid inputs. You may only accept positive integer numbers for the x and y coordinates of the three points on a 40 x 40 grid. Your program should be repeated as long as the user wishes.

The following is a sample program output:

```
This program calculates the perimeter of a Triangle.

Please enter the x-coordinate of point1: 5
Please enter the y-coordinate of point1: 5
Please enter the x-coordinate of point2: 6
Please enter the y-coordinate of point2: 7
Please enter the x-coordinate of point3: 8
Please enter the y-coordinate of point3: 5

The perimeter of a Triangle with point1 (5, 5), point2 (6, 7) and point3
(8, 5)
is 8.064495

Would you like to repeat the program? (Enter 1 for yes): 2
```

Hints:

- To calculate the square root of a number stored in variable "data" you can use the function `Math.sqrt(data)`
- Use Pythagoras' theorem to calculate the length of the triangle sides

a) Write the program in Java. Provide all the material requested below at the very bottom ("Requested material…")

Advice for user input:

- **Usage of the class `Input.java` for user input (read operations) is mandatory for assignments 1-5.** Please find the class (source code) in the exercise directory on the webpage: `(http://www.pervasive.jku.at/Teaching/lvaInfo.php?key=352&do=uebungen)`
  This class provides various methods to read values of different data types. In order to read digits and numbers from the console, you may for example, use the following functions:
  - `Input.readInt()` – reads an integer from the console (data type: `int`)
  - `Input.readFloat()` – reads a floating point number (data type: `float`)

  Example:

```
- int x;
- float y;
- System.out.println("x = ");
- x = Input.readInt ();  // read integer x
- System.out.println("y = ");
- y = Input.readFloat();  // read floating point number y
```

Requested material for all programming problems:

- **For each exercise, hand in the following:**
  a) **The idea for your solution written in text form**
  b) **Source code (Java classes including English(!) comments)**
  c) **Test plan for analyzing boundary values (e.g., minimal temperature allowed, maximum number of input, etc.) and exceptional cases (e.g., textual input when a number is required, etc.). State the expected behavior of the program for each input and make sure there is no "undefined" behavior leading to runtime exceptions. List all your test cases in a table (test case #, description, user input, expected (return) values).**
  d) **The output of your java program for all test cases in your test plan**
- Pay attention to using adequate and reasonable data types and meaningful English variable names for your implementation, check the user input carefully and print out meaningful error messages.