ITTalents Training Camp Season 6

Test 1

Introduction to programming

Name:_____

Points on theory: _____ of 100 %

Points on practice tasks: _____ of 100 %

Time available to complete the test: 3 hours.

Minimum passing score: 50% on theory and 50% on practice tasks.

Theory

1: (25%) What is the difference between primitive data types and reference data types in Java? Describe the main differences concerning memory storage and common operations with variables of both types. Describe all primitive data types you know.

2: (25%) Describe all the data structures you know and the complexity of main operations.

3: (25%) What is Recursion? Describe it with examples. Describe the differences between an infinite loop and an infinite recursion.

4: (25%) What is the definition of an algorithm? Why do we use algorithms? What is algorithm complexity? Describe the most common complexities you know. Describe how Bubble sort works. What is the complexity of Bubble sort? When can we use Bubble sort?

Practice tasks

1: (25%) Write a program that reads three characters separated by space – each one - the strength of a card. Possible inputs are from 2..9 or T, J, Q, K, A. If the input is invalid the program must output the following : “Invalid cards given!”. The inputs are infinite. The program must stop when the cards are in ascending order. Finally, the program must ouput the number of tries.

Example (program output is in bold):

3 4 2

J 2 6

1 T K

Invalid cards given!

P J K

Invalid cards given!

2 9 J

Number of tries : 3

2: (25%) Write a function that takes a 2 String variables that hold some text. The program must output all the words that appear in the first text but not in the second one. The words are separated only with space.

Example :

Simple sentence that is first.

Another sentence that is second.

Output:

The words are : Simple, first.

3: (25%) Write a method that by given array of integers, and a positive number X, returns the product of all odd elements that are greater than X. Use recursion!

4: (25%) Write a method that finds whether there is path between two given cells in 2D labyrinth. The method takes 5 parameters – the coordinates of the two cells and the labyrinth itself. The labyrinth has walls marked with symbol 'W', that you cannot pass through. The other cells are marked with ' '. The method must return true or false depending on whether there is a path between start and end cells.