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%) What do you know about the String data type? How is it different from other referent data types? Describe at least 3 common methods with String variables.

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 Quick sort works. What is the complexity of Quick sort? When can we use Quick sort?

Practice tasks

1: (25%) Write a program that reads two 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 3 consecutive pairs of ace(A) and king(K) are given. Finally, the program must ouput the number of tries.

Example (program output is in bold):

3 4

J 2

1 T

Invalid cards given!

A K

J A

A K

K A

A K

Number of tries : 7

2: (25%) Write a function that takes a 3 String variables that hold some text. The program must output the longest word that appears in all the three texts. The words are separated only with space.

Example :
Simple sentence **that** is first.

Another one **that** is second.

Third sentence **that** is last.

Output:

The word is : that.

3: (25%) Write a method that by given array of integers returns the sum of all elements that are divisible by 3. Use recursion!

4: (25%) Write a method that by given 2D labyrinth represented as matrix filled with 'W' for walls and ' ' (space) for empty cell, returns the number of steps to exit the labyrinth. You cannot pass through walls and you can move only up, down, left or right. If there is no way to escape the labyrinth, then -1 should be returned as a result.