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%) Describe all operations you can do with variables in Java. Describe arithmetic operators, logical operators and bitwise operators. Explain with examples.

2: (25%) What are methods in Java? What are they used for and how are they defined? Give examples. What is scope of variables? How are primitives and reference data types passed to a method as arguments?

3: (25%) How does Java work? How does Java process the written code? What are the differences between JDK, JRE and JVM?

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 Counting sort works. What is the complexity of Counting sort? When can we use Counting 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 two aces (A) 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 A

Number of tries : 3

2: (25%) Write a function that takes a String variable that holds some text. The program must output the length of the longest sentence in a text and the number of sentences. It's given that each sentence start with capital letter and there are no other capital letter words in each sentence.

Example :
Today is a good day for test. Sun is shining. The students are happy. The birds are blue.

Output:

Today is a good day for test.
4 sentences in the text.

3: (25%) Write a method that by given array of integers verifies whether all the elements are positive numbers. The method must return result of type boolean. Use recursion!

4: (25%) Write a method that by given chessboard filled with figures on some squares, coordinates of knight and king, finds whether the knight can reach the king. The knight can move only on “Г”-shaped moves. The method must return true/false. The other figures are marked with 'X' on the board and the empty squares are marked with ' ' (space).