ITTalents Training Camp Season 5

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

4: (25%) What is a Divide and Conquer algorithm? What Divide and Conquer algorithms do you know? Describe the main idea of each one and its complexity.

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Practice tasks

1: (25%) Write a program that reads the result of a coin toss from the console. The possible inputs are "Heads" or "Tails". The inputs are infinite. The program must stop reading only if there are 5 consecutive "Heads" coin tosses.

2: (25%) Write a method that takes a String variable that holds some text. The text contains words that are separated by a single space. The method must return the most frequent word from the text.

3: (25%) Write a method that finds and retrieves the difference between the minimum and the maximum element in an array of numbers. Use recursion.

4: (25%) Write a method that represents the operation "paint brush" in Paint. The method takes a matrix of pixels N*N and the coordinates of a single pixel of the matrix as parameters. We know that the matrix contains areas, surrounded by black pixels (cells that contain the letter 'b'). The method then paints the whole area around the pixel that is surrounded by black pixels or that ends with the border of the matrix. Painting the area means setting all pixels to red (the letter 'r').

Examples:

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