

PRACTICAL EXAM [3] – CSD201 – FALL 2023

Duration: 85 minutes

Requirements:

- + Students can use their own previous lab exercises, course notes, but NOT internet access. Write the code and comment in it for any explanation, archive and name the final file: csd201_pe.zip
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1. Write a Java program to read the data from the provided CSV file[GDP2022.csv] and load it into an array of **Country** objects. It will be also acceptable to manually input data within the main function if you have a problem with the read file. Each **Country** object should have properties for Country **Code**, **Rank**, **Name**, and **GDP**. Each **Country** object should also implement the **Comparable** interface, defining the natural ordering based on country names(Alphabetic). [2 marks]
2. Implement the **Quick Sort** algorithm to sort the array of **Country** objects using the **compareTo** method for comparison. Discuss why **Quick Sort** might not be guaranteed to have the best-case time complexity. [2 marks]
3. Build an **AVL tree** using the **Country** objects, taking advantage of the natural ordering provided by the **compareTo** method. Implement the necessary methods for **insertion**, **searching**, and **deletion** in the AVL tree. . It will be also acceptable to create a **BST** for this question, but it must be discussed about its disadvantage to **AVL tree**. [3 marks]
4. Implement a tree traversal function in your tree class to perform an **in-order traversal** and count how many country names start with a specified character, such as 'A.' Explain the time complexity of this traversal operation. [1 marks]
5. Write a main function to test all above requirements. [2 marks]

Note: Submit 1 java file only!
