Assignment 2: Divide and Conquer

Overview

The goal of this assignment is to familiarize students with divide and conquer algorithms. Through this assignment the students will learn the structure, complexity, and development of divide and conquer algorithms. This assignment has 65 points.

Rules and Deliverables

- This is an individual assignment.
- Cheating of any kind is NOT tolerated! Assignments will be checked against each other, and illegal collaboration will be treated based on the University dishonesty policy.
- The due date will be **Wednesday 02/19/2025 at 11:59pm.**
- Submitting the assignment 24 hours after the due date will result in a deduction of 20% from the student's grade.
- Each student must submit the answers document in PDF format, along with clean, bug-free, and easily executable source code (mandatory for Question 2(b)).
    - The code can be written in any of the imperative programming languages, like Python, Java, C, C++
- Zip all files into a single folder named as the student's EUID and submit it through Canvas.

Assignment Description

1. Use <u>Divide and Conquer</u> to solve this problem:

    a) Ternary search algorithm: Explain the steps for an algorithm that searches a sorted list of n items by dividing it into three sub-lists of almost n/3 items. (15 points)

    b) Analyze your algorithm and give the results using order notation. (10 points)

2. Use <u>Divide and Conquer</u> to solve this problem:
    Given a string s and an integer k, return the length of the longest substring of s such that the frequency of each character in this substring is greater than or equal to k.
    If no such substring exists, return 0.
    Example: If s= aababbcac and k=3, then answer is 6 because of aababb substring.

    a) Write the pseudocode and explain the algorithm (20 points)

    b) <u>Implement</u> the algorithm. (20 points)