Lumu Technologies

Intern Test

At Lumu, we believe that a solid foundation in computer science is crucial for a successful career in software development, regardless of your role or specialization. This test is designed to help us understand your reasoning process and programming background. It is not intended to evaluate your skills in depth, but rather to facilitate a conversation with you. Please attempt as many problems as you feel comfortable with, and feel free to skip any that you consider beyond your current abilities.

Problem 1: Arrays and Sorting

Write a function that takes an array of integers as input and sorts it in ascending order using any sorting algorithm of your choice. Provide the implementation and the time complexity analysis of your solution.

Example:

Input: [4, 2, 9, 1, 7]

Output: [1, 2, 4, 7, 9]

Problem 2: Recursion

Implement a recursive function called recursiveReverseString that takes a string as input and returns the reversed version of that string. The function should use recursion to reverse the string. For example, if the input is "Hello, World!", the function should return "!dlroW ,olleH".

Problem 3: Algorithms and Complexity

You are given an array of integers. Write an algorithm to find the maximum difference between any two numbers in the array. Provide the algorithm and analyze its time complexity.

Example:

Input: [7, 2, 9, 5, 1, 6]

Output: 8 (The maximum difference is between 1 and 9)

Problem 4: Problem Solving

You are given a list of integers. Write a function that finds and returns two elements in the list that sum up to a given target value. If such elements do not exist, return an empty list.

Example:

Input: [3, 6, 9, 12, 4, 1], target = 10

Output: [6, 4] (6 + 4 = 10)

Problem 5: Databases

Consider a database table called "Students" with the following columns: "ID" (integer), "Name" (string), and "Age" (integer). Write a SQL query to retrieve the names of all students whose age is greater than 18. Provide the SQL query and explain its execution.

Requirements:

- Upload your code and written answers to GitHub and share the repository link with us.
- Provide clear instructions on how to run your code.