

Coding assignment

Note: 1) It is free to use any popular languages for this assignment, including C++, Java, and Python. But I highly recommend most of students to use Python. The solution to the following assignments will be based on Python; 2) Obtaining the output is only the first step, please notice the corner cases, time complexity, space complexity and try to optimize your code.

1. Power function

Define a power function $power(x, n)$. Require $O(\log n)$ time

e.g. $x = 9.8, n = 3$, output: 941.192; $x = 1, n = 0$, output: 1.

2. Given a list of numbers, *numbers*, of n integers, please find two elements in this list such that their sum is closest one to a target number, *target*. Please return the absolute value of difference between the sum and the target. Require $O(n \log n)$ time

e.g. $numbers = [-1, -1, -1, -4]$ and $target = 4$. Output: 6.

3. Please find the first unique character in a given string.

e.g. $str = "abaccdeff"$, output = 'b'