

Lab 8

1. Longest Common Subsequence (LCS)

Given two strings A and B , find the **length of their longest common subsequence (LCS)** and a string of the longest length. A subsequence is a sequence that appears in the same relative order, but not necessarily contiguous.

2. Longest Palindromic Subsequence (LPS)

Problem Statement:

Given a string S , find the **length of the longest palindromic subsequence (LPS)** and also return the subsequence.

3. Longest Palindromic Odd Subsequence (LPOS)

Given a string S , find the **length of the longest palindromic subsequence that has an odd length only**.

Input: abccba

Output: 3

Explanation: The longest palindromic subsequence is “abccba” (length 6, even). The longest odd-length palindromic subsequence is “aba” or “aca” of length 3.

Example 2:

Input: character

Output: 5

Explanation: The longest odd-length palindromic subsequence is “carac” (length 5).

4. Given a sequence of pairs $(a_1, b_1), (a_2, b_2), \dots, (a_n, b_n)$, you are allowed to select only one number from each pair (either a_i or b_i) to form a sequence. The objective is to find the length of the longest increasing subsequence (LIS) that can be formed by selecting one number from each pair. Devise a dynamic programming based algorithm that runs in $O(n^2)$ time.

Consider the following sequence of pairs: $(3, 8), (2, 5), (6, 7), (4, 1)$. The LIS is 3. The sequence is $(3, 5, 7)$.

5. Best Contiguous Segment with Up to K Drops

You are given an array $A[1 \dots n]$ of integers representing quiz marks. You need to find the maximum possible sum of a **contiguous subarray** after dropping at most k elements from that subarray.

Input Format:

- First line: Two integers n and k .
- Second line: n integers representing the array $A[1], A[2], \dots, A[n]$.

Output Format:

- A single integer — the maximum sum of a contiguous subarray after dropping at most k elements.

Input:

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10 2
4 -2 5 -1 3 7 5 -3 2 -4
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Output:

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24
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Input:

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5 1
-1 2 3 -4 5
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Output:

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10
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6. Maximum Sum Increasing Subsequence (MSIS)

You are given an array $A[1 \dots n]$. Find the maximum possible sum of an increasing subsequence of the array.

Input Format:

- First line: n
- Second line: n integers $A[1], A[2], \dots, A[N]$

Output Format:

- A single integer — the maximum sum of an increasing subsequence.

Example:

Input:

7
1 101 2 3 100 4 5

Output:

106

7. Longest Common Increasing Subsequence (LCIS)

You are given two sequences $A[1 \dots N]$ and $B[1 \dots M]$. Find the length of the longest common subsequence which is strictly increasing.

Example:

Input:

3 4 9 1 20 10
5 3 8 9 10

Output:

3