Date: 26/04/21

Black Board

Design and Analysis of Algorithms
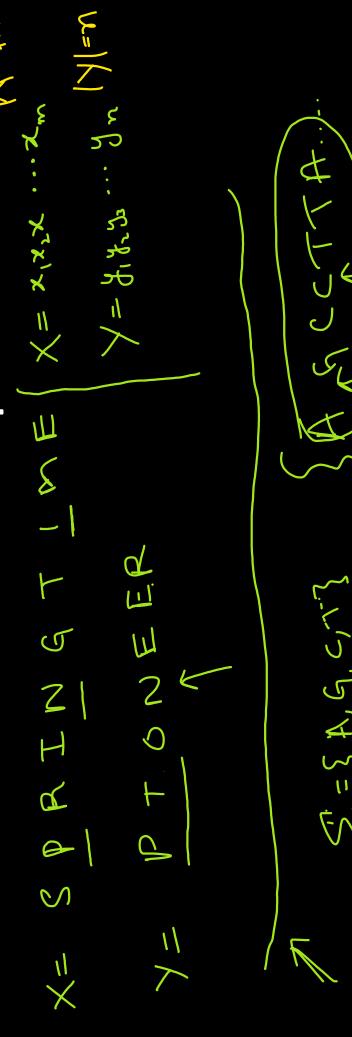
Topics:

- Dynamic Programming V
  - THE LONGEST COMMON SUBSEQUENCE PROBLEM

The LCS Problem

- **Input:** Two strings X and Y or lengths m and n respectively.

- **Output:** The Longest Common Subsequence between X and Y

Some Examples

$|X| = m$

$X = \text{SPRINGTIME}$

$X = x_1 x_2 x \ldots x_m$

$|Y| = n$

$Y = \text{PIONEER}$

$Y = y_1 y_2 y_3 \ldots y_n$

AGCCTTA

$\Sigma = \{A, G, C, T\ldots\}$

HELP
PHD

The Brute Force Algorithm

— Take ⊗ and generate all its subsequence.

$$|of| = m$$
$$|f| = 2^m$$

$$\frac{2+2+2+\cdots}{\quad} = 2^m$$

1/0 1/0 1/0
1/0 1/0 1/0

Check whether the subsequence exists in ??? also exists in ???

a b c
a b c

$$T(m,n) = O(n\,2^m)$$