C++ STL Intermediate Problem Solving

- Viraj Chandra

Problem 1

Same Differences:

https://codeforces.com/problemset/problem/1520/D

N

$a = a_1 \quad a_2 \quad a_3 \quad \ldots \quad a_n$

(i, j)

$i < j$

$a_j - a_i = j - i$

all such pairs ?

2×10^8 ops

$\Rightarrow$ ops/testcase $= \frac{2 \times 10^8}{10^4} = 2 \times 10^4$

$t_1 \Rightarrow n_1 \approx 2 \times 10^5$

O(n) will not work

$\rightarrow n \approx 2 \times 10^5$

1 test

↓

10^4 test case

$t_1 \quad t_2 \quad t_3 \quad \ldots \quad t_{10^4}$

$n_1 \quad n_2 \quad n_3 \quad \ldots \quad + n_{10^4} \leq 2 \cdot 10^5$

$$n_i \approx \frac{2 \times 10^5}{10^4} \approx 2 \times 10 = 20$$

1 test = 2×10^8

$n \approx 10^5$

$O(n \log n)$ ✓

$O(n)$ ✓

NO

TLE

$$\underbrace{a_j - a_i}_{\text{LHS}} = \underbrace{j - i}_{\text{RHS}}$$

$$\underbrace{a_j - j}_{\text{LHS}} = \underbrace{a_i - i}_{\text{RHS}}$$

$$\{a_x - x\} = dx$$

$$\underbrace{d_1 \quad d_2 \quad d_3 \quad d_4 \quad \ldots \quad d_{n-1} \quad d_n}$$

3 3 4 3 1 2 2

$3^{(2)} = 3 + 2^{(2)} = 1 + 0 + 0 \Rightarrow (4)$

$^nC_2$

↳ Combinatorics

↳ $\frac{n!}{(n-2)!\,2!}$ $\Rightarrow$ $\frac{(n)(n-1)}{2}$

n freq

Problem 2

Eating Candies:

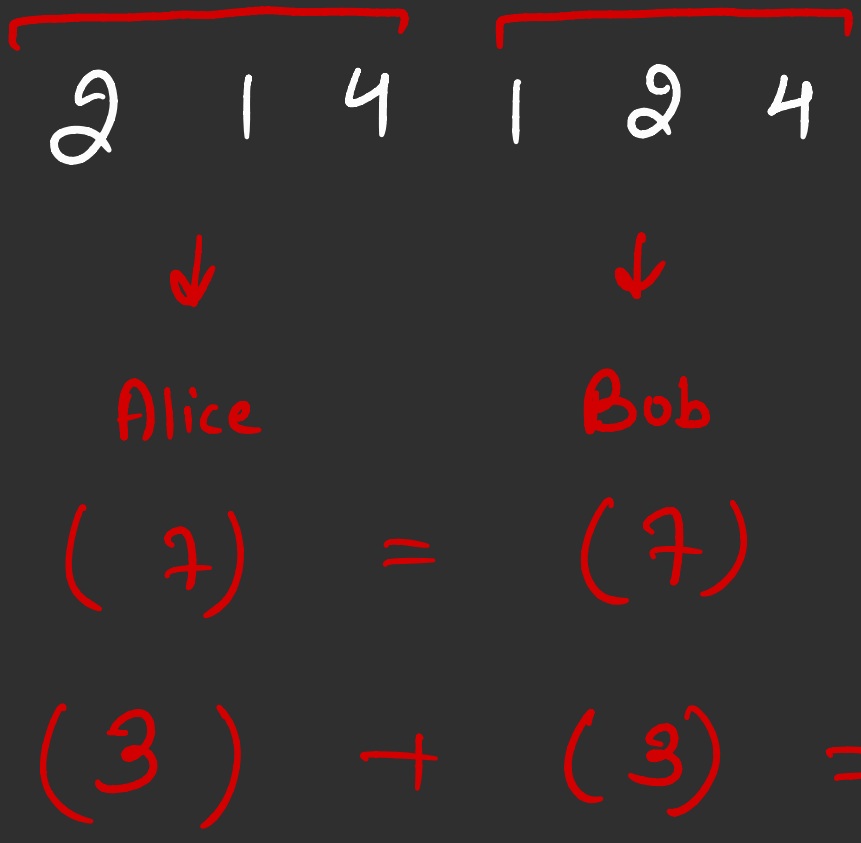
https://codeforces.com/problemset/problem/1669/F

Alice → ← Bob

w_1 w_2 w_3 w_4 . . . . . w_{n-2} w_{n-1} w_n

w_A == w_B

$(n_A$ + $n_B)$



$O(n \log n)$ ✓

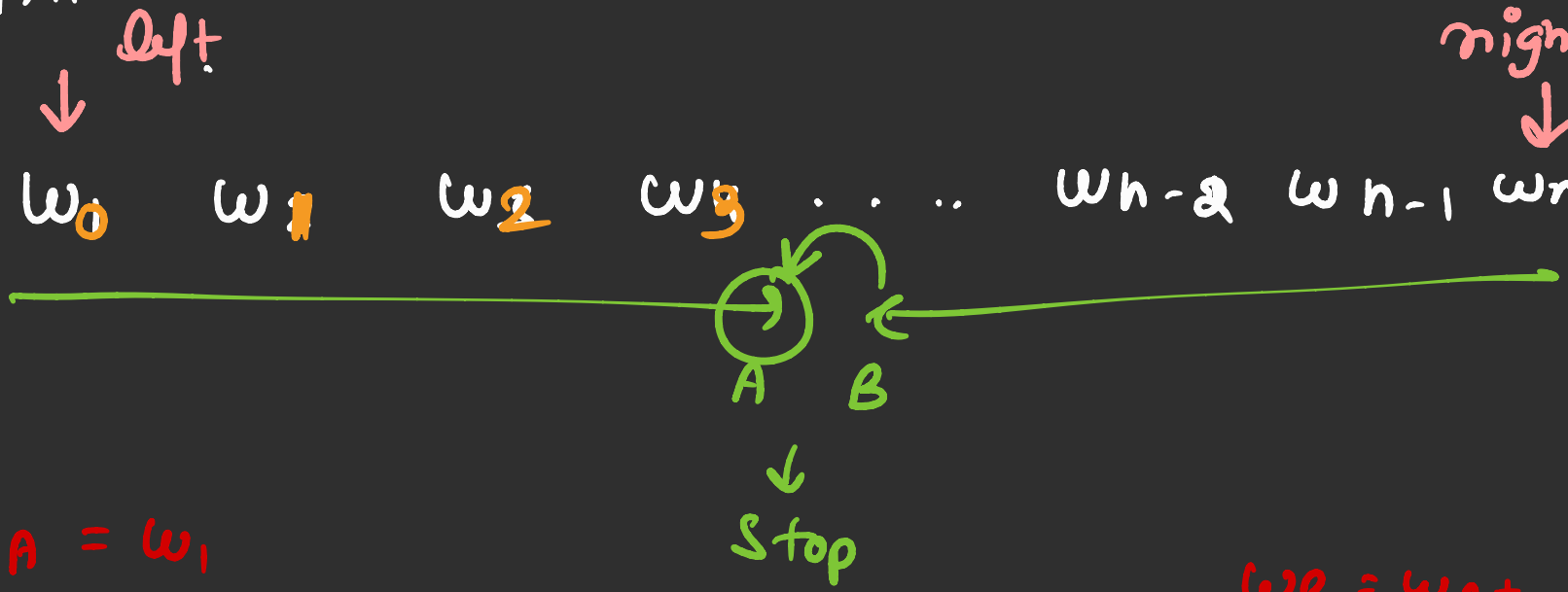
$O(n)$ ✓

$O(n^2)$ ↑ X

(2 Pointer)

Ali

(Bob)



$w_A = w_1$

$w_B = w_n + w_{n-1}$

I $w_A == w_B$ → Step 1
Lets note candy count
Step 2
Let's both move
} 1

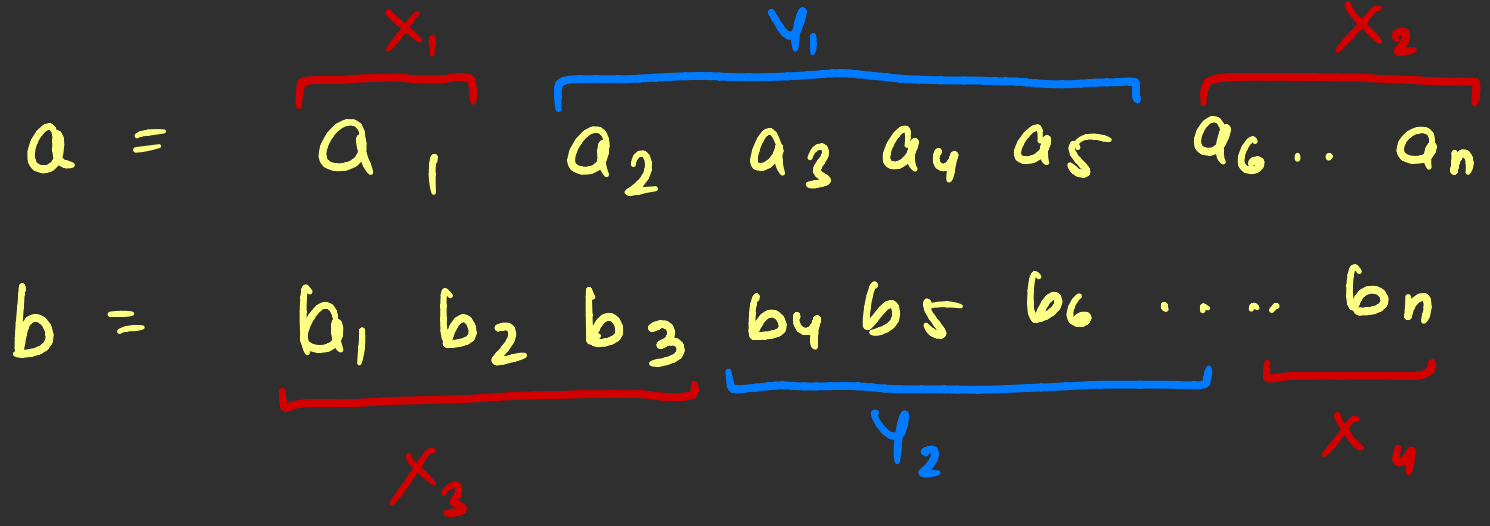
II $w_A > w_B$
↳ Bob moves
} 2

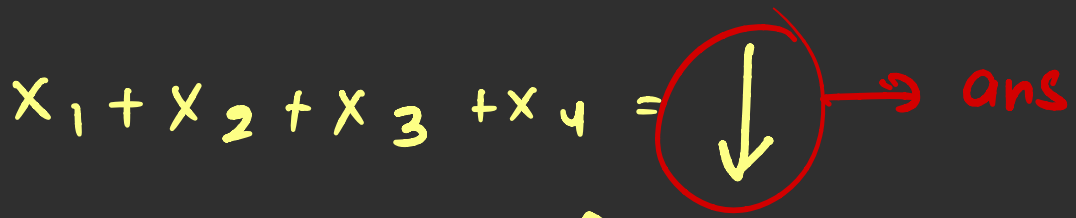
III $w_A < w_B$ ↳ Alice moves
} 3

Problem 3

Double-ended Strings:

https://codeforces.com/problemset/problem/1506/C





$$(|A| + |B| - 2 \times LCS)$$

↓

Ans

Portion - Substring

largest - longest

same - common

longest common substring (LCS)

DSA

Recursion + DP

$O(|a| \times |b|)$

$20^2 \rightarrow 20^3 \rightarrow 20^4$

16×10^4

$\approx 1 \cdot \times 10^5$

ops / testcase $= \frac{2 \times 10^8}{10^2}$

$= 2 \times 10^6$