



C++ STL Intermediate Problem Solving

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Problem 1

Same Differences:

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

N

a = a₁ a₂ a₃ . . . a_n

(^oi, ^oj)

i < j

a_j - a_i = j - i

all such
pairs ?

2×10^8 ops

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

$t_1 \Rightarrow n_1 \approx \underline{\underline{2 \times 10^5}}$

$O(n)$ will not work
 $\rightarrow n \approx \underline{\underline{2 \times 10^5}}$

1 test



10^4 test case

$$\begin{array}{ccccccc} t_1 & t_2 & t_3 & \dots & & t_{10^4} \\ n_1 & n_2 & n_3 & & \dots & + n_{10^4} \leq 2 \cdot 10^5 \\ \hline \end{array}$$

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

$$1 \text{ test} = 2 \times 10^3$$

$$n \approx 10^5$$

$$\begin{aligned} O(n \log n) \\ O(n) \end{aligned}$$

NO }
TLE }

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

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

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

$$\underbrace{d_1 \ d_2 \ d_3 \ d_4 \ \dots \ \dots \ d_{n-1} \ d_n}_{\begin{array}{c} \checkmark \\ \checkmark \end{array}} \quad \uparrow$$

$$-3\textcircled{2} = 3 + 2\textcircled{2} = 1 + 0 + 0 \Rightarrow \textcircled{4}$$

$n \choose 2$

↳ Combinatorics

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

$$\frac{(n)(n-1)}{2}$$

$\frac{n}{\text{freq}}$



Problem 2

Eating Candies:

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

Alice \rightarrow

$\omega_1 \quad \omega_2 \quad \omega_3 \quad \omega_4 \quad \dots \dots \quad \omega_{n-2} \quad \omega_{n-1} \quad \omega_n$

\leftarrow Bob

ω_A
 n_A

$= =$

$+$

ω_B
 n_B) \uparrow

$$\begin{array}{c} 2 \quad | \quad 4 \quad | \quad 2 \quad 4 \\ \downarrow \qquad \qquad \qquad \downarrow \end{array}$$

Alice

Bob

$$(2) = (7)$$

$$(3) + (3) = 6$$

$O(n \log n)$ ✓

$O(n)$ ✓

$O(n^2)$ ↑ ✗

(2 Pointer)

Ali

↓ left

w_0 w_1

w_2

w_3

...

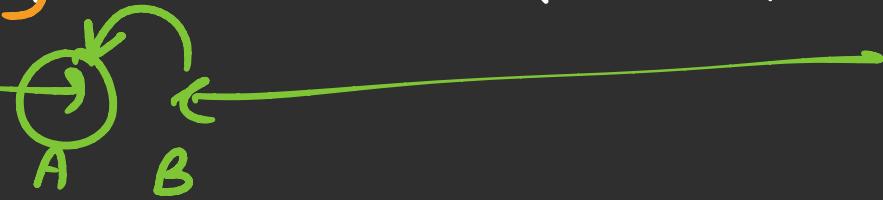
w_{n-2}

w_{n-1}

w_n

(Bob)

night
↓



$$w_A = w_1$$

↓
Stop

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

I $w_A = w_B \rightarrow$ Step 1

Let's note candy count

1

II $w_A > w_B$ Step 2
Let's both move

Bob moves

2

III $w_A < w_B$ Alice moves

3



Problem 3

Double-ended Strings:

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

$$a = \overbrace{a_1}^{x_1} \overbrace{a_2 \ a_3 \ a_4 \ a_5}^{y_1} \overbrace{a_6 \dots a_n}^{x_2}$$
$$b = \underbrace{b_1 \ b_2 \ b_3}_{x_3} \underbrace{b_4 \ b_5 \ b_6 \ \dots \ b_n}_{y_2} \underbrace{}_{x_4}$$
$$x_1 + x_2 + x_3 + x_4 = \text{ans}$$
$$y_1 + y_2 = \uparrow$$
$$\downarrow \downarrow$$

LCS LCS

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



Ans

portion - substring

largest - longest

same - common

longest common substring (LCS)

DSA

Recursion + DP

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

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

$$\frac{20^2 \rightarrow 20^3 \rightarrow \cancel{20^4}}{= 2 \times 10^6}$$

$\frac{16 \times 10^4}{\approx 1 \times 10^5} \quad \} \quad \checkmark$

```
for(           len ) ← n
```

```
{ "len" ← 3
```

```
for( a string → len ) ) ← n
```

```
{ for( b - string → len ) ← n
```

```
  { if( e - a == e - b ) ← len  
    } } n
```

$O(n^4) \Rightarrow \underline{\underline{\mathcal{O}^4}}$