$O(n)$

prefix sum

$$\text{Sum}(l,r) = \text{Sum}(0,r) - \text{Sum}(0,l-1)$$

$\hookrightarrow O(1)$

$q \to$ queries

$l_i \quad r_i$

$O(q+n)$

2	2	
0	4	$\to a_0 + a_1 + a_2 + a_3 + a_4$
1	3	$\to a_1 + a_2 + a_3$
2	5	$\to a_2 + a_3 + a_4 + a_5$
1	4	$\to a_1 + a_2 + a_3 + a_4$

sum

1 2

	0	1	2	3	4	5
	1	2	1	0	-1	2
	1	3	4	4	3	

$\sum q[i] \, r \, q_{r_0}[i]$

$1 \; 1 \; 3 \; 3 \; 4 \; 4$

Q_n

0	1	2	3	4	5	6	7	8
0	1	1	0	0	0	-1	0	0
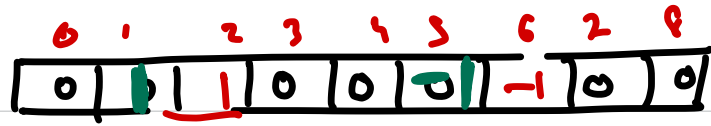
prefixsum → cumulative Sum

$q \rightarrow$ queries

$l_i \quad r_i \quad]$

$a[l] += 1$

$a[r+1] -= 1$

$O(q)$

$O(n)$

$O(q+n)$

2   5

1   4
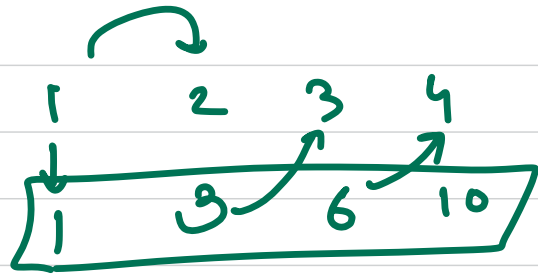
1	2	3	4
1	3	6	10

→ cumulative Sum

Some indexes are occupy more frequently in

Our Serv

→ how about finding the index which is

affected by most Queries

S 3

S 2 4 1 3

1	2	3	4	5
1	1	1	3	3

1 5 4 → 0 4

2 3 → 1 2

2 3 → 1 2

0	1	2	3	4
1	+1	0	-1	0

1 2 0 -2 0

1	3	3	1	1

1	5	4	2	3

$1 \times 1 + 3 \times 5 + 3 \times 4 + 1 \times 2 + 1 \times 3$
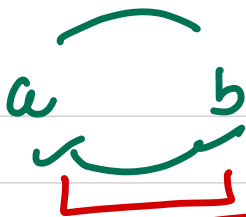
Sum

$\longrightarrow$

$\overset{\frown}{a \quad b}$

31   30

$ab > ba$

a, b, c

$ab > ba$

9   30

$\underline{\underline{a, b}}$ $\underline{c}.$

$$ab > ba$$

$$bc > cb$$

$$ac > \underline{\underline{ca}}$$

a	b
9	30
-	-
c	b
	30

b	c	a
5	6	9
		9

ab   ba
9 5 > 8 9

bc   cb
5 6   6 5

ac   c a
9 6   6 9

$\rightarrow$ a, b, c $\rightarrow$ non-negative

$\overline{a, b, c}$

$ab > ba$ and $bc > cb$ then

$a = 9$ $b = 30$

$ab = 930$ $9 \times 10^2 + 30$

$aC > C9$

$\rightarrow ab > bc$

$|x| \rightarrow$ no. of digits

$\rightarrow a \times 10^{\wedge |b|} + b > b \times 10^{|a|} + a$ $\textcircled{1}$

$bc > cb$

$b \times 10^{|c|} + c > c \times 10^{|b|} + b$ $\textcircled{11}$

$$ab \quad > \quad bc$$

$$a \times 10^{\wedge |b|} + b \quad > \quad b \times 10^{|a|} + a$$

$$bc \quad > \quad cb$$

$$b \times 10^{|c|} + c \quad > \quad c \times 10^{|b|} + b$$

$$a\left(10^{|b|} - 1\right) \quad > \quad b\left(10^{|a|} - 1\right)$$

$$b\left(10^{|c|} - 1\right) \quad > \quad c\left(10^{|b|} - 1\right)$$

$$a\,b\left(10^{|c|} - 1\right)\left(10^{|b|} - 1\right) \quad > \quad b\,c\left(10^{|a|} - 1\right)\left(10^{|b|} - 1\right)$$

$$a\left(10^{|c|} - 1\right) \quad > \quad c\left(10^{|a|} - 1\right)$$

$$a \times 10^{|c|} - a \quad > \quad c \times 10^{|a|} - c$$

$$a \times 10^{|c|} + c \quad > \quad c \times 10^{|a|} + a$$

$$\boxed{ac \quad > \quad ca}$$

$$a \qquad b \qquad\qquad c$$

$$ab > ba \quad , \qquad bc > cb$$

$$\boxed{ac > ca}$$

ab   ba

a = 30   b = 34   a = 9   b = 34

ba > ab   ab > ba

$$a \quad b$$

cmp (a, b)
ab < ba   sort
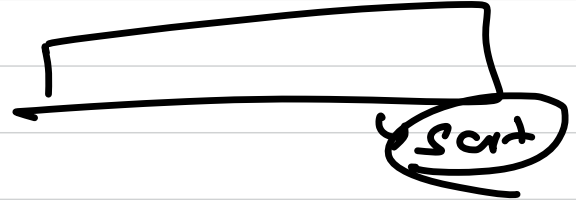
3, 30, 34

3, 30, 34

3, 34, 30

| 34, 3, 30 |

| 34 3 30 |

330

303

34, 3, 30

a   b   c

ab > ba

bc > cb

ac > ca

3430 > 3034

$$34 \; , \; 3 \; , \; 30$$

$$\underbrace{34}_{a} \; , \; \underbrace{3}_{b} \; , \; \underbrace{30}_{c}$$

$$a b > b a$$
$$b c > c a$$

$$a c > c a$$

$$a c > c a$$

$$@ \; b c^2 > c b a$$

$$3430 > 3034$$

$$\boxed{34}30 > \boxed{30}34$$

$$\overline{3, 30, 37}$$
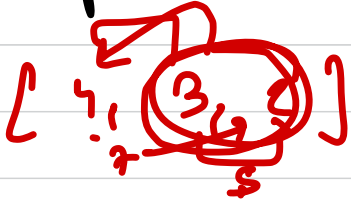
3   37   30

34   3   30

Qn. You're given n ropes of diff lgth. We need to merge them ropes. into one rope. Cost of merging 2 ropes is equal to sum of their length. Merge all the ropes with min cost.

$[\ ^4_7\ \ (3\ _2\ )]$

$\sum a_i \times f_i$

① $5 + 9 \rightarrow 14$

$\left\{ \begin{array}{l} (3+2) + (3+2+4) \Rightarrow 14 \\ (4+3) + (4+3+2) \Rightarrow 16 \end{array} \right.$

② $7 + 9 \rightarrow 16$

$\int$

$\int \to$ (min leaf)

(nlogn)

$\begin{pmatrix} x \\ y \end{pmatrix} \to$ (p·q)

$y \to$ $\to$ min element

$\boxed{x+y} \to 2$

4, 3, 2

Ans for 2

7, 3
↓
5

4, 5
9

cur → ∅ 8^k 7 1 4