# **BST** maintenance

Consider a binary search tree T which is initially empty. Also, consider the first N positive integers  $\{1, 2, 3, 4, 5, \dots, N\}$  and its permutation  $P\{a_1, a_2, \dots, a_N\}$ .

If we start adding these numbers to the binary search tree T, starting from  $a_1$ , continuing with  $a_2$ , ... (and so on) ..., ending with  $a_N$ . After every addition we ask you to output the sum of distances between every pair of T's nodes.

### **Input Format**

The first line of the input consists of the single integer  $\mathbf{N}$ , the size of the list.

The second line of the input contains **N** single space separated numbers the permutation  $a_1, a_2, ..., a_N$  itself.

## **Constraints**

 $1 \le N \le 250000$ 

### **Output Format**

Output N lines.

On the ith line output the sum of distances between every pair of nodes after adding the first i numbers from the permutation to the binary search tree T

#### Sample Input #00

```
8
4 7 3 1 8 2 6 5
```

#### Sample Output #00

```
0
1
4
10
20
35
52
76
```

# Explanation #00

After adding the first element, the distance is 0 as there is only 1 element

```
4
```

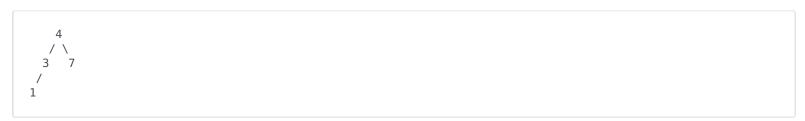
After adding the second element, the distance between 2 nodes is 1.

```
4
\
7
```

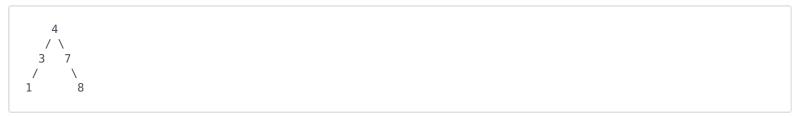
After adding the third element, the distance between every pair of elements is 2+1+1=4

```
4
/\
3 7
```

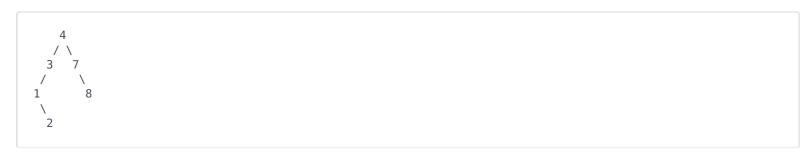
After adding the fourth element, the distance between every pair of elements is 3 + 2 + 1 + 2 + 1 + 1 = 10



After adding the fifth element, the distance between every pair of elements is 4 + 3 + 2 + 1 + 3 + 2 + 1 + 2 + 1 + 1 = 20



After adding the sixth element, the distance between every pair of elements is 5 + 4 + 3 + 2 + 1 + 4 + 3 + 2 + 1 + 2 + 1 + 1 = 35



After adding the seventh element, the distance between every pair of elements is 5+5+4+3+2+1+4+4+3+2+1+3+3+2+1+2+2+1+1+1+2=52

```
4
/\
3 7
/ /\
1 6 8
\
2
```

After adding the final element, the distance between every pair of elements is 6+5+5+4+3+2+1+5+4+4+3+2+1+4+3+3+2+1+3+2+1+2+1+2+1+3=76

