Week #3

A. Calculating Function

1 second, 256 megabytes

For a positive integer n let's define a function f:

$f(n) = -1 + 2 - 3 + .. + (-1)^n n$

Your task is to calculate $f(n)$ for a given integer n.

Input

The single line contains the positive integer n ($1 \le n \le 10^{15}$).

Output

Print $f(n)$ in a single line.

input
4
output
2

input
5
output
-3

$f(4) = -1 + 2 - 3 + 4 = 2$

$f(5) = -1 + 2 - 3 + 4 - 5 = -3$

B. Case of the Zeros and Ones

1 second, 256 megabytes

Andrewid the Android is a galaxy-famous detective. In his free time he likes to think about strings containing zeros and ones.

Once he thought about a string of length n consisting of zeroes and ones. Consider the following operation: we choose any two *adjacent* positions in the string, and if one them contains 0, and the other contains 1, then we are allowed to remove these two digits from the string, obtaining a string of length $n - 2$ as a result.

Now Andreid thinks about what is the minimum length of the string that can remain after applying the described operation several times (possibly, zero)? Help him to calculate this number.

Input

First line of the input contains a single integer n ($1 \le n \le 2 \cdot 10^5$), the length of the string that Andreid has.

The second line contains the string of length n consisting only from zeros and ones.

Output

Output the minimum length of the string that may remain after applying the described operations several times.

input
4 1100
output
0

input
5 01010

output

```
1
```

input

```
8
11101111
```

output

```
6
```

In the first sample test it is possible to change the string like the following: $1100 \to 10 \to (empty)$.

In the second sample test it is possible to change the string like the following: $01010 \to 010 \to 0$.

In the third sample test it is possible to change the string like the following: $11101111 \to 111111$.

C. Even Odds

1 second, 256 megabytes

Being a nonconformist, Volodya is displeased with the current state of things, particularly with the order of natural numbers (natural number is positive integer number). He is determined to rearrange them. But there are too many natural numbers, so Volodya decided to start with the first n. He writes down the following sequence of numbers: firstly all odd integers from 1 to n (in ascending order), then all even integers from 1 to n (also in ascending order). Help our hero to find out which number will stand at the position number k.

Input

The only line of input contains integers n and k ($1 \le k \le n \le 10^{12}$).

Please, do not use the `%lld` specifier to read or write 64-bit integers in C++. It is preferred to use the `cin`, `cout` streams or the `%I64d` specifier.

Output

Print the number that will stand at the position number k after Volodya's manipulations.

input

```
10 3
```

output

```
5
```

input

```
7 7
```

output

```
6
```

In the first sample Volodya's sequence will look like this: {1, 3, 5, 7, 9, 2, 4, 6, 8, 10}. The third place in the sequence is therefore occupied by the number 5.

D. Tricky Sum

1 second, 256 megabytes

In this problem you are to calculate the sum of all integers from 1 to n, but you should take all powers of two with minus in the sum.

For example, for $n = 4$ the sum is equal to $-1 - 2 + 3 - 4 = -4$, because 1, 2 and 4 are 2^0, 2^1 and 2^2 respectively.

Calculate the answer for t values of n.

Input

The first line of the input contains a single integer t ($1 \le t \le 100$) — the number of values of n to be processed.

Each of next t lines contains a single integer n ($1 \le n \le 10^9$).

Output

Print the requested sum for each of t integers n given in the input.

input
2 4 1000000000
output
-4 499999998352516354

The answer for the first sample is explained in the statement.

E. Pangram

2 seconds, 256 megabytes

A word or a sentence in some language is called a *pangram* if all the characters of the alphabet of this language appear in it *at least once*. Pangrams are often used to demonstrate fonts in printing or test the output devices.

You are given a string consisting of lowercase and uppercase Latin letters. Check whether this string is a pangram. We say that the string contains a letter of the Latin alphabet if this letter occurs in the string in uppercase or lowercase.

Input

The first line contains a single integer n $(1 \le n \le 100)$ — the number of characters in the string.

The second line contains the string. The string consists only of uppercase and lowercase Latin letters.

Output

Output "YES", if the string is a pangram and "NO" otherwise.

input
12 toosmallword
output
NO

input
35 TheQuickBrownFoxJumpsOverTheLazyDog
output
YES

F. Kuriyama Mirai's Stones

2 seconds, 256 megabytes

Kuriyama Mirai has killed many monsters and got many (namely n) stones. She numbers the stones from 1 to n. The cost of the i-th stone is v_i. Kuriyama Mirai wants to know something about these stones so she will ask you two kinds of questions:

1. She will tell you two numbers, l and r $(1 \le l \le r \le n)$, and you should tell her $\sum_{i=l}^{r} v_i$.
2. Let u_i be the cost of the i-th cheapest stone (the cost that will be on the i-th place if we arrange all the stone costs in non-decreasing order). This time she will tell you two numbers, l and r $(1 \le l \le r \le n)$, and you should tell her $\sum_{i=l}^{r} u_i$.

For every question you should give the correct answer, or Kuriyama Mirai will say "fuyukai desu" and then become unhappy.

Input

The first line contains an integer n $(1 \le n \le 10^5)$. The second line contains n integers: $v_1, v_2, ..., v_n$ $(1 \le v_i \le 10^9)$ — costs of the stones.

The third line contains an integer m $(1 \le m \le 10^5)$ — the number of Kuriyama Mirai's questions. Then follow m lines, each line contains three integers $type$, l and r $(1 \le l \le r \le n;\ 1 \le type \le 2)$, describing a question. If $type$ equal to 1, then you should output the answer for the first question, else you should output the answer for the second one.

Output

Print m lines. Each line must contain an integer — the answer to Kuriyama Mirai's question. Print the answers to the questions in the order of input.

input

```
6
6 4 2 7 2 7
3
2 3 6
1 3 4
1 1 6
```

output

```
24
9
28
```

input

```
4
5 5 2 3
10
1 2 4
2 1 4
1 1 1
2 1 4
2 1 2
1 1 1
1 3 3
1 1 3
1 4 4
1 2 2
```

output

```
10
15
5
15
5
5
2
12
3
5
```

Please note that the answers to the questions may overflow 32-bit integer type.

G. Count The Pairs (Hard-1)

1 second, 256 megabytes

Given an array of N numbers, count the number of ordered pairs of indices i, j such that $i \neq j$, $1 \leq i < j \leq N$ and $a[i] + a[j] == min(a) + max(a)$ i.e. the sum of those two numbers equals the sum of both the minimum and maximum numbers in the array.

Input

The first line of input contains one integer N such that $1 \leq N \leq 10^5$ the number of elements in the array The second line contains N space-separated integers each $1 \leq a[i] \leq 10^6$

Output

print the answer in one line, the number of ordered pairs of indices such that the sum of their two values equals the sum of the maximum + minimum numbers in the given array.

input
```
8
1 2 4 5 6 6 8 8
```
output
```
3
```

input
```
8
1 2 4 5 5 6 10 10
```
output
```
4
```

H. Stripe

2 seconds, 64 megabytes

Once Bob took a paper stripe of n squares (the height of the stripe is 1 square). In each square he wrote an integer number, possibly negative. He became interested in how many ways exist to cut this stripe into two pieces so that the sum of numbers from one piece is equal to the sum of numbers from the other piece, and each piece contains positive integer amount of squares. Would you help Bob solve this problem?

Input

The first input line contains integer n $(1 \leq n \leq 10^5)$ — amount of squares in the stripe. The second line contains n space-separated numbers — they are the numbers written in the squares of the stripe. These numbers are integer and do not exceed 10000 in absolute value.

Output

Output the amount of ways to cut the stripe into two non-empty pieces so that the sum of numbers from one piece is equal to the sum of numbers from the other piece. Don't forget that it's allowed to cut the stripe along the squares' borders only.

input
```
9
1 5 -6 7 9 -16 0 -2 2
```
output
```
3
```

input
```
3
1 1 1
```
output
```
0
```

input
```
2
0 0
```
output
```
1
```