Codeforces Round #353 (Div. 2)

A. Infinite Sequence

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

Vasya likes everything infinite. Now he is studying the properties of a sequence s, such that its first element is equal to a ($s_1 = a$), and the difference between any two neighbouring elements is equal to c ($s_i - s_{i-1} = c$). In particular, Vasya wonders if his favourite integer b appears in this sequence, that is, there exists a positive integer i, such that $s_i = b$. Of course, you are the person he asks for a help.

Input

The first line of the input contain three integers a, b and c ($-10^9 \le a, b, c \le 10^9$) — the first element of the sequence, Vasya's favorite number and the difference between any two neighbouring elements of the sequence, respectively.

Output

If b appears in the sequence s print "YES" (without quotes), otherwise print "NO" (without quotes).

Examples

input
1 7 3
output
YES

input
10 10 0
output
YES

input
1 -4 5
output
NO

input
0 60 50
output
NO

Note

In the first sample, the sequence starts from integers $1, 4, 7$, so 7 is its element.

In the second sample, the favorite integer of Vasya is equal to the first element of the sequence.

In the third sample all elements of the sequence are greater than Vasya's favorite integer.

In the fourth sample, the sequence starts from $0, 50, 100$, and all the following elements are greater than Vasya's favorite integer.

B. Restoring Painting

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

Vasya works as a watchman in the gallery. Unfortunately, one of the most expensive paintings was stolen while he was on duty. He doesn't want to be fired, so he has to quickly restore the painting. He remembers some facts about it.

- The painting is a square 3×3, each cell contains a single integer from 1 to n, and different cells may contain either different or equal integers.
- The sum of integers in each of four squares 2×2 is equal to the sum of integers in the top left square 2×2.
- Four elements a, b, c and d are known and are located as shown on the picture below.

Help Vasya find out the number of distinct squares the satisfy all the conditions above. Note, that this number may be equal to 0, meaning Vasya remembers something wrong.

Two squares are considered to be different, if there exists a cell that contains two different integers in different squares.

Input

The first line of the input contains five integers n, a, b, c and d ($1 \le n \le 100\,000$, $1 \le a, b, c, d \le n$) — maximum possible value of an integer in the cell and four integers that Vasya remembers.

Output

Print one integer — the number of distinct valid squares.

Examples

input
2 1 1 1 2
output
2

input
3 3 1 2 3
output
6

Note

Below are all the possible paintings for the first sample.

In the second sample, only paintings displayed below satisfy all the rules.

C. Money Transfers

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

There are n banks in the city where Vasya lives, they are located in a circle, such that any two banks are neighbouring if their indices differ by no more than 1. Also, bank 1 and bank n are neighbours if $n > 1$. No bank is a neighbour of itself.

Vasya has an account in each bank. Its balance may be negative, meaning Vasya owes some money to this bank.

There is only one type of operations available: transfer some amount of money from any bank to account in any **neighbouring** bank. There are no restrictions on the size of the sum being transferred or balance requirements to perform this operation.

Vasya doesn't like to deal with large numbers, so he asks you to determine the minimum number of operations required to change the balance of each bank account to zero. It's guaranteed, that this is possible to achieve, that is, the total balance of Vasya in all banks is equal to zero.

Input

The first line of the input contains a single integer n ($1 \le n \le 100\,000$) — the number of banks.

The second line contains n integers a_i (- $10^9 \le a_i \le 10^9$), the i-th of them is equal to the initial balance of the account in the i-th bank. It's guaranteed that the sum of all a_i is equal to 0.

Output

Print the minimum number of operations required to change balance in each bank to zero.

Examples

input
3 5 0 -5
output
1

input
4 -1 0 1 0
output
2

input
4 1 2 3 -6
output
3

Note

In the first sample, Vasya may transfer 5 from the first bank to the third.

In the second sample, Vasya may first transfer 1 from the third bank to the second, and then 1 from the second to the first.

In the third sample, the following sequence provides the optimal answer:

1. transfer 1 from the first bank to the second bank;
2. transfer 3 from the second bank to the third;
3. transfer 6 from the third bank to the fourth.

D. Tree Construction

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

During the programming classes Vasya was assigned a difficult problem. However, he doesn't know how to code and was unable to find the solution in the Internet, so he asks you to help.

You are given a sequence a, consisting of n **distinct** integers, that is used to construct the binary search tree. Below is the formal description of the construction process.

1. First element a_1 becomes the root of the tree.
2. Elements $a_2, a_3, ..., a_n$ are added one by one. To add element a_i one needs to traverse the tree starting from the root and using the following rules:
   a. The pointer to the current node is set to the root.
   b. If a_i is greater than the value in the current node, then its right child becomes the current node. Otherwise, the left child of the current node becomes the new current node.
   c. If at some point there is no required child, the new node is created, it is assigned value a_i and becomes the corresponding child of the current node.

Input

The first line of the input contains a single integer n $(2 \le n \le 100\,000)$ — the length of the sequence a.

The second line contains n distinct integers a_i $(1 \le a_i \le 10^9)$ — the sequence a itself.

Output

Output n - 1 integers. For all $i > 1$ print the value written in the node that is the parent of the node with value a_i in it.

Examples

input
3 1 2 3
output
1 2

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

Note

Picture below represents the tree obtained in the first sample.

Picture below represents the tree obtained in the second sample.

E. Trains and Statistic

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Vasya commutes by train every day. There are n train stations in the city, and at the i-th station it's possible to buy only tickets to stations from $i+1$ to a_i inclusive. No tickets are sold at the last station.

Let $\rho_{i,j}$ be the minimum number of tickets one needs to buy in order to get from stations i to station j. As Vasya is fond of different useless statistic he asks you to compute the sum of all values $\rho_{i,j}$ among all pairs $1 \le i < j \le n$.

Input

The first line of the input contains a single integer n $(2 \le n \le 100\,000)$ — the number of stations.

The second line contains n - 1 integer a_i $(i+1 \le a_i \le n)$, the i-th of them means that at the i-th station one may buy tickets to each station from $i+1$ to a_i inclusive.

Output

Print the sum of $\rho_{i,j}$ among all pairs of $1 \le i < j \le n$.

Examples

input
4 4 4 4
output
6

input
5 2 3 5 5
output
17

Note

In the first sample it's possible to get from any station to any other (with greater index) using only one ticket. The total number of pairs is 6, so the answer is also 6.

Consider the second sample:

- $\rho_{1,2} = 1$
- $\rho_{1,3} = 2$
- $\rho_{1,4} = 3$
- $\rho_{1,5} = 3$
- $\rho_{2,3} = 1$
- $\rho_{2,4} = 2$
- $\rho_{2,5} = 2$
- $\rho_{3,4} = 1$
- $\rho_{3,5} = 1$
- $\rho_{4,5} = 1$

Thus the answer equals $1+2+3+3+1+2+2+1+1+1 = 17$.