Codeforces Round #211 (Div. 2)

A. Soroban

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

You know that Japan is the country with almost the largest 'electronic devices per person' ratio. So you might be quite surprised to find out that the primary school in Japan teaches to count using a *Soroban* — an abacus developed in Japan. This phenomenon has its reasons, of course, but we are not going to speak about them. Let's have a look at the Soroban's construction.

Soroban consists of some number of rods, each rod contains five beads. We will assume that the rods are horizontal lines. One bead on each rod (the leftmost one) is divided from the others by a bar (the reckoning bar). This single bead is called *go-dama* and four others are *ichi-damas*. Each rod is responsible for representing a single digit from 0 to 9. We can obtain the value of a digit by following simple algorithm:

- Set the value of a digit equal to 0.
- If the go-dama is shifted to the right, add 5.
- Add the number of ichi-damas shifted to the left.

Thus, the upper rod on the picture shows digit 0, the middle one shows digit 2 and the lower one shows 7. We will consider the top rod to represent the last decimal digit of a number, so the picture shows number 720.

Write the program that prints the way Soroban shows the given number n.

Input

The first line contains a single integer n ($0 \le n < 10^9$).

Output

Print the description of the decimal digits of number n **from the last one to the first one (as mentioned on the picture in the statement)**, one per line. Print the beads as large English letters 'O', rod pieces as character '-' and the reckoning bar as '|'. Print as many rods, as many digits are in the decimal representation of number n without leading zeroes. We can assume that number 0 has no leading zeroes.

Examples

input
2
output
O-|OO-OO

input
13
output
O-|OOO-O O-|O-OOO

input
720
output
O-|-OOOO O-|OO-OO -O|OO-OO

B. Fence

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

There is a fence in front of Polycarpus's home. The fence consists of n planks of the same width which go one after another from left to right. The height of the i-th plank is h_i meters, distinct planks can have distinct heights.

Fence for $n = 7$ and $h = [1, 2, 6, 1, 1, 7, 1]$

Polycarpus has bought a posh piano and is thinking about how to get it into the house. In order to carry out his plan, he needs to take exactly k consecutive planks from the fence. Higher planks are harder to tear off the fence, so Polycarpus wants to find such k consecutive planks that the sum of their heights is minimal possible.

Write the program that finds the indexes of k consecutive planks with minimal total height. Pay attention, the fence is not around Polycarpus's home, it is in front of home (in other words, the fence isn't cyclic).

Input

The first line of the input contains integers n and k ($1 \le n \le 1.5 \cdot 10^5$, $1 \le k \le n$) — the number of planks in the fence and the width of the hole for the piano. The second line contains the sequence of integers $h_1, h_2, \ldots, h_n$ ($1 \le h_i \le 100$), where h_i is the height of the i-th plank of the fence.

Output

Print such integer j that the sum of the heights of planks $j, j + 1, \ldots, j + k - 1$ is the minimum possible. If there are multiple such j's, print any of them.

Examples

input
7 3 1 2 6 1 1 7 1
output
3

Note

In the sample, your task is to find three consecutive planks with the minimum sum of heights. In the given case three planks with indexes 3, 4 and 5 have the required attribute, their total height is 8.

C. Fixing Typos

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

Many modern text editors automatically check the spelling of the user's text. Some editors even suggest how to correct typos.

In this problem your task to implement a small functionality to correct two types of typos in a word. We will assume that three identical letters together is a typo (for example, word "`helllo`" contains a typo). Besides, a couple of identical letters immediately followed by another couple of identical letters is a typo too (for example, words "`helloo`" and "`wwaatt`" contain typos).

Write a code that deletes the minimum number of letters from a word, correcting described typos in the word. You are allowed to delete letters from both ends and from the middle of the word.

Input

The single line of the input contains word s, its length is from 1 to 200000 characters. The given word s consists of lowercase English letters.

Output

Print such word t that it doesn't contain any typos described in the problem statement and is obtained from s by deleting the least number of letters.

If there are multiple solutions, print any of them.

Examples

input
helloo
output
hello

input
wooooooow
output
woow

Note

The second valid answer to the test from the statement is "`heloo`".

D. Renting Bikes

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

A group of n schoolboys decided to ride bikes. As nobody of them has a bike, the boys need to rent them.

The renting site offered them m bikes. The renting price is different for different bikes, renting the j-th bike costs p_j rubles.

In total, the boys' shared budget is a rubles. Besides, each of them has his own personal money, the i-th boy has b_i personal rubles. The shared budget can be spent on any schoolchildren arbitrarily, but each boy's personal money can be spent on renting only this boy's bike.

Each boy can rent *at most one bike*, one cannot give his bike to somebody else.

What maximum number of schoolboys will be able to ride bikes? What minimum sum of personal money will they have to spend in total to let as many schoolchildren ride bikes as possible?

Input

The first line of the input contains three integers n, m and a ($1 \le n, m \le 10^5$; $0 \le a \le 10^9$). The second line contains the sequence of integers $b_1, b_2, \ldots, b_n$ ($1 \le b_i \le 10^4$), where b_i is the amount of the i-th boy's personal money. The third line contains the sequence of integers $p_1, p_2, \ldots, p_m$ ($1 \le p_j \le 10^9$), where p_j is the price for renting the j-th bike.

Output

Print two integers r and s, where r is the maximum number of schoolboys that can rent a bike and s is the minimum total personal money needed to rent r bikes. If the schoolchildren cannot rent any bikes, then $r = s = 0$.

Examples

input
2 2 10 5 5 7 6
output
2 3

input
4 5 2 8 1 1 2 6 3 7 5 2
output
3 8

Note

In the first sample both schoolchildren can rent a bike. For instance, they can split the shared budget in half (5 rubles each). In this case one of them will have to pay 1 ruble from the personal money and the other one will have to pay 2 rubles from the personal money. In total, they spend 3 rubles of their personal money. This way of distribution of money minimizes the amount of spent personal money.

E. Two Circles

time limit per test: 4 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Let's assume that we are given an $n \times m$ table filled by integers. We'll mark a cell in the i-th row and j-th column as (i, j). Thus, $(1, 1)$ is the upper left cell of the table and (n, m) is the lower right cell. We'll assume that a circle of radius r with the center in cell (i_0, j_0) is a set of such cells (i, j) that $\sqrt{(i - i_0)^2 + (j - j_0)^2} \le r$. We'll consider only the circles that do not go beyond the limits of the table, that is, for which $r + 1 \le i_0 \le n - r$ and $r + 1 \le j_0 \le m - r$.

A circle of radius 3 with the center at $(4, 5)$.

Find two such non-intersecting circles of the given radius r that the sum of numbers in the cells that belong to these circles is maximum. Two circles intersect if there is a cell that belongs to both circles. As there can be more than one way to choose a pair of circles with the maximum sum, we will also be interested in the number of such pairs. Calculate the number of unordered pairs of circles, for instance, a pair of circles of radius 2 with centers at $(3, 4)$ and $(7, 7)$ is the same pair as the pair of circles of radius 2 with centers at $(7, 7)$ and $(3, 4)$.

Input

The first line contains three integers n, m and r ($2 \le n, m \le 500$, $r \ge 0$). Each of the following n lines contains m integers from 1 to 1000 each — the elements of the table. The rows of the table are listed from top to bottom at the elements in the rows are listed from left to right. It is guaranteed that there is at least one circle of radius r, not going beyond the table limits.

Output

Print two integers — the maximum sum of numbers in the cells that are located into two non-intersecting circles and the number of pairs of non-intersecting circles with the maximum sum. If there isn't a single pair of non-intersecting circles, print `0 0`.

Examples

input
2 2 0 1 2 2 4
output
6 2

input
5 6 1 4 2 1 3 2 6 2 3 2 4 7 2 5 2 2 1 1 3 1 4 3 3 6 4 5 1 4 2 3 2
output
34 3

input
3 3 1 1 2 3 4 5 6 7 8 9
output
0 0