Codeforces Round #312 (Div. 2)

A. Lala Land and Apple Trees

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

Amr lives in Lala Land. Lala Land is a very beautiful country that is located on a coordinate line. Lala Land is famous with its apple trees growing everywhere.

Lala Land has exactly n apple trees. Tree number i is located in a position x_i and has a_i apples growing on it. Amr wants to collect apples from the apple trees. Amr currently stands in $x = 0$ position. At the beginning, he can choose whether to go right or left. He'll continue in his direction until he meets an apple tree he didn't visit before. He'll take all of its apples and then reverse his direction, continue walking in this direction until he meets another apple tree he didn't visit before and so on. In the other words, Amr reverses his direction when visiting each new apple tree. Amr will stop collecting apples when there are no more trees he didn't visit in the direction he is facing.

What is the maximum number of apples he can collect?

Input

The first line contains one number n ($1 \le n \le 100$), the number of apple trees in Lala Land.

The following n lines contains two integers each x_i, a_i ($-10^5 \le x_i \le 10^5$, $x_i \neq 0$, $1 \le a_i \le 10^5$), representing the position of the i-th tree and number of apples on it.

It's guaranteed that there is at most one apple tree at each coordinate. It's guaranteed that no tree grows in point 0.

Output

Output the maximum number of apples Amr can collect.

Examples

input
2 -1 5 1 5
output
10

input
3 -2 2 1 4 -1 3
output
9

input
3 1 9 3 5 7 10
output
9

Note

In the first sample test it doesn't matter if Amr chose at first to go left or right. In both cases he'll get all the apples.

In the second sample test the optimal solution is to go left to $x = -1$, collect apples from there, then the direction will be reversed, Amr has to go to $x = 1$, collect apples from there, then the direction will be reversed and Amr goes to the final tree $x = -2$.

In the third sample test the optimal solution is to go right to $x = 1$, collect apples from there, then the direction will be reversed and Amr will not be able to collect anymore apples because there are no apple trees to his left.

B. Amr and The Large Array

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

Amr has got a large array of size n. Amr doesn't like large arrays so he intends to make it smaller.

Amr doesn't care about anything in the array except the beauty of it. The beauty of the array is defined to be the maximum number of times that some number occurs in this array. He wants to choose the smallest subsegment of this array such that the beauty of it will be the same as the original array.

Help Amr by choosing the smallest subsegment possible.

Input

The first line contains one number n ($1 \le n \le 10^5$), the size of the array.

The second line contains n integers a_i ($1 \le a_i \le 10^6$), representing elements of the array.

Output

Output two integers l, r ($1 \le l \le r \le n$), the beginning and the end of the subsegment chosen respectively.

If there are several possible answers you may output any of them.

Examples

input
5 1 1 2 2 1
output
1 5

input
5 1 2 2 3 1
output
2 3

input
6 1 2 2 1 1 2
output
1 5

Note

A subsegment B of an array A from l to r is an array of size $r - l + 1$ where $B_i = A_{l+i-1}$ for all $1 \le i \le r - l + 1$

C. Amr and Chemistry

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

Amr loves Chemistry, and specially doing experiments. He is preparing for a new interesting experiment.

Amr has n different types of chemicals. Each chemical i has an initial volume of a_i liters. For this experiment, Amr has to mix all the chemicals together, but all the chemicals volumes must be equal first. So his task is to make all the chemicals volumes equal.

To do this, Amr can do two different kind of operations.

- Choose some chemical i and double its current volume so the new volume will be $2a_i$
- Choose some chemical i and divide its volume by two (integer division) so the new volume will be $\lfloor \frac{a_i}{2} \rfloor$

Suppose that each chemical is contained in a vessel of infinite volume. Now Amr wonders what is the minimum number of operations required to make all the chemicals volumes equal?

Input

The first line contains one number n ($1 \le n \le 10^5$), the number of chemicals.

The second line contains n space separated integers a_i ($1 \le a_i \le 10^5$), representing the initial volume of the i-th chemical in liters.

Output

Output one integer the minimum number of operations required to make all the chemicals volumes equal.

Examples

input
3 4 8 2

output
2

input
3 3 5 6

output
5

Note

In the first sample test, the optimal solution is to divide the second chemical volume by two, and multiply the third chemical volume by two to make all the volumes equal 4.

In the second sample test, the optimal solution is to divide the first chemical volume by two, and divide the second and the third chemical volumes by two twice to make all the volumes equal 1.

D. Guess Your Way Out! II

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

Amr bought a new video game "Guess Your Way Out! II". The goal of the game is to find an exit from the maze that looks like a perfect binary tree of height h. The player is initially standing at the root of the tree and the exit from the tree is located at some leaf node.

Let's index all the nodes of the tree such that

- The root is number 1
- Each internal node i ($i \le 2^{h-1} - 1$) will have a left child with index = $2i$ and a right child with index = $2i + 1$

The level of a node is defined as 1 for a root, or 1 + level of parent of the node otherwise. The vertices of the level h are called leaves. The exit to the maze is located at some leaf node n, the player doesn't know where the exit is so he has to guess his way out!

In the new version of the game the player is allowed to ask questions on the format "Does the $ancestor(exit, i)$ node number belong to the range $[L, R]$?". Here $ancestor(v, i)$ is the ancestor of a node v that located in the level i. The game will answer with "Yes" or "No" only. The game is designed such that it doesn't always answer correctly, and sometimes it cheats to confuse the player!.

Amr asked a lot of questions and got confused by all these answers, so he asked you to help him. Given the questions and its answers, can you identify whether the game is telling contradictory information or not? If the information is not contradictory and the exit node can be determined uniquely, output its number. If the information is not contradictory, but the exit node isn't defined uniquely, output that the number of questions is not sufficient. Otherwise output that the information is contradictory.

Input

The first line contains two integers h, q ($1 \le h \le 50$, $0 \le q \le 10^5$), the height of the tree and the number of questions respectively.

The next q lines will contain four integers each i, L, R, ans ($1 \le i \le h$, $2^{i-1} \le L \le R \le 2^i - 1$, $ans \in \{0, 1\}$), representing a question as described in the statement with its answer ($ans = 1$ if the answer is "Yes" and $ans = 0$ if the answer is "No").

Output

If the information provided by the game is contradictory output "Game cheated!" without the quotes.

Else if you can uniquely identify the exit to the maze output its index.

Otherwise output "Data not sufficient!" without the quotes.

Examples

input
3 1 3 4 6 0
output
7

input
4 3 4 10 14 1 3 6 6 0 2 3 3 1
output
14

input
4 2 3 4 6 1 4 12 15 1
output
Data not sufficient!

input
4 2 3 4 5 1

2 3 3 1
output
Game cheated!

Note

Node U is an ancestor of node V if and only if

- U is the same node as V,
- U is the parent of node V,
- or U is an ancestor of the parent of node V.

In the first sample test there are 4 leaf nodes $4, 5, 6, 7$. The first question says that the node isn't in the range $[4, 6]$ so the exit is node number 7.

In the second sample test there are 8 leaf nodes. After the first question the exit is in the range $[10, 14]$. After the second and the third questions only node number 14 is correct. Check the picture below to fully understand.

E. A Simple Task

time limit per test: 5 seconds
memory limit per test: 512 megabytes
input: standard input
output: standard output

This task is very simple. Given a string S of length n and q queries each query is on the format $i\ j\ k$ which means sort the substring consisting of the characters from i to j in non-decreasing order if $k = 1$ or in non-increasing order if $k = 0$.

Output the final string after applying the queries.

Input

The first line will contain two integers n, q ($1 \le n \le 10^5$, $0 \le q \le 50\,000$), the length of the string and the number of queries respectively.

Next line contains a string S itself. It contains only lowercase English letters.

Next q lines will contain three integers each i, j, k ($1 \le i \le j \le n$, $k \in \{0, 1\}$).

Output

Output one line, the string S after applying the queries.

Examples

input
10 5 abacdabcda 7 10 0 5 8 1 1 4 0 3 6 0 7 10 1

output
cbcaaaabdd

input
10 1 agjucbvdfk 1 10 1

output
abcdfgjkuv

Note

First sample test explanation:

$abacda\mathbf{bcda} \rightarrow abacda\mathbf{dcba}$

$abac\mathbf{dadc}ba \rightarrow abac\mathbf{acdd}ba$

$\mathbf{abac}acddba \rightarrow \mathbf{cbaa}acddba$

$cb\mathbf{aaac}ddba \rightarrow cb\mathbf{caaa}ddba$

$cbcaaa\mathbf{ddba} \rightarrow cbcaaa\mathbf{abdd}$