Codeforces Round #727 (Div. 2)

A. Contest Start

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

There are n people participating in some contest, they start participating in x minutes intervals. That means the first participant starts at time 0, the second participant starts at time x, the third — at time $2 \cdot x$, and so on.

Duration of contest is t minutes for each participant, so the first participant finishes the contest at time t, the second — at time $t + x$, and so on. When a participant finishes the contest, their dissatisfaction equals to the number of participants that started the contest (or starting it now), but haven't yet finished it.

Determine the sum of dissatisfaction of all participants.

Input

The first line contains a single integer k ($1 \leq k \leq 1000$) — the number of test cases.

Each of the next k lines contains three integers n, x, t ($1 \leq n, x, t \leq 2 \cdot 10^9$) — the number of participants, the start interval and the contest duration.

Output

Print k lines, in the i-th line print the total dissatisfaction of participants in the i-th test case.

Example

input
4 4 2 5 3 1 2 3 3 10 2000000000 1 2000000000
output
5 3 3 1999999999000000000

Note

In the first example the first participant starts at 0 and finishes at time 5. By that time the second and the third participants start, so the dissatisfaction of the first participant is 2.

The second participant starts at time 2 and finishes at time 7. By that time the third the fourth participants start, so the dissatisfaction of the second participant is 2.

The third participant starts at 4 and finishes at 9. By that time the fourth participant starts, so the dissatisfaction of the third participant is 1.

The fourth participant starts at 6 and finishes at 11. By time 11 everyone finishes the contest, so the dissatisfaction of the fourth participant is 0.

In the second example the first participant starts at 0 and finishes at time 2. By that time the second participants starts, and the third starts at exactly time 2. So the dissatisfaction of the first participant is 2.

The second participant starts at time 1 and finishes at time 3. At that time the third participant is solving the contest.

B. Love Song

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

Petya once wrote a sad love song and shared it to Vasya. The song is a string consisting of lowercase English letters. Vasya made up q questions about this song. Each question is about a subsegment of the song starting from the l-th letter to the r-th letter. Vasya considers a substring made up from characters on this segment and repeats each letter in the subsegment k times, where k is the index of the corresponding letter in the alphabet. For example, if the question is about the substring "abbcb", then Vasya repeats letter 'a' once, each of the letters 'b' twice, letter 'c" three times, so that the resulting string is "abbbbcccbb", its length is 10. Vasya is interested about the length of the resulting string.

Help Petya find the length of each string obtained by Vasya.

Input
The first line contains two integers n and q ($1 \le n \le 100\,000$, $1 \le q \le 100\,000$) — the length of the song and the number of questions.

The second line contains one string s — the song, consisting of n lowercase letters of English letters.

Vasya's questions are contained in the next q lines. Each line contains two integers l and r ($1 \le l \le r \le n$) — the bounds of the question.

Output
Print q lines: for each question print the length of the string obtained by Vasya.

Examples

input
7 3 abacaba 1 3 2 5 1 7
output
4 7 11

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

input
13 7 sonoshikumiwo 1 5 2 10 7 7 1 13 4 8 2 5 3 9
output
82 125 9 191 62 63 97

Note
In the first example Vasya is interested in three questions. In the first question Vasya considers the substring "aba", that transforms to "abba", so the answer is equal to 4. In the second question Vasya considers "baca", that transforms to "bbaccca", so the answer is 7. In the third question Vasya considers the string "abacaba",that transforms to "abbacccabba" of length 11.

C. Stable Groups

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

There are n students numerated from 1 to n. The level of the i-th student is a_i. You need to split the students into *stable groups*. A group of students is called *stable*, if in the sorted array of their levels no two neighboring elements differ by more than x.

For example, if $x = 4$, then the group with levels $[1, 10, 8, 4, 4]$ is stable (because $4 - 1 \le x$, $4 - 4 \le x$, $8 - 4 \le x$, $10 - 8 \le x$), while the group with levels $[2, 10, 10, 7]$ is not stable ($7 - 2 = 5 > x$).

Apart from the n given students, teachers can invite at most k additional students with **arbitrary** levels (at teachers' choice). Find

the minimum number of stable groups teachers can form from all students (including the newly invited).

For example, if there are two students with levels 1 and 5; $x = 2$; and $k \geq 1$, then you can invite a new student with level 3 and put all the students in one stable group.

Input
The first line contains three integers n, k, x ($1 \leq n \leq 200\,000$, $0 \leq k \leq 10^{18}$, $1 \leq x \leq 10^{18}$) — the initial number of students, the number of students you can additionally invite, and the maximum allowed level difference.

The second line contains n integers $a_1, a_2, \ldots, a_n$ ($1 \leq a_i \leq 10^{18}$) — the students levels.

Output
In the only line print a single integer: the minimum number of stable groups you can split the students into.

Examples

input
8 2 3 1 1 5 8 12 13 20 22
output
2

input
13 0 37 20 20 80 70 70 70 420 5 1 5 1 60 90
output
3

Note
In the first example you can invite two students with levels 2 and 11. Then you can split the students into two stable groups:

1. $[1, 1, 2, 5, 8, 11, 12, 13]$,
2. $[20, 22]$.

In the second example you are not allowed to invite new students, so you need 3 groups:

1. $[1, 1, 5, 5, 20, 20]$
2. $[60, 70, 70, 70, 80, 90]$
3. $[420]$

D. PriceFixed

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

Lena is the most economical girl in Moscow. So, when her dad asks her to buy some food for a trip to the country, she goes to the best store — "PriceFixed". Here are some rules of that store:

- The store has an infinite number of items of every product.
- All products have the same price: 2 rubles per item.
- For every product i there is a discount for experienced buyers: if you buy b_i items of products (**of any type**, not necessarily type i), then for all future purchases of the i-th product there is a 50% discount (so you can buy an item of the i-th product for 1 ruble!).

Lena needs to buy n products: she must purchase at least a_i items of the i-th product. Help Lena to calculate the minimum amount of money she needs to spend if she optimally chooses the order of purchasing. Note that if she wants, she can buy more items of some product than needed.

Input
The first line contains a single integer n ($1 \leq n \leq 100\,000$) — the number of products.

Each of next n lines contains a product description. Each description consists of two integers a_i and b_i ($1 \leq a_i \leq 10^{14}$, $1 \leq b_i \leq 10^{14}$) — the required number of the i-th product and how many products you need to buy to get the discount on the i-th product.

The sum of all a_i does not exceed 10^{14}.

Output
Output the minimum sum that Lena needs to make all purchases.

Examples

input

3 3 4 1 3 1 5

output
8

input
5 2 7 2 8 1 2 2 4 1 8

output
12

Note

In the first example, Lena can purchase the products in the following way:

1. one item of product 3 for 2 rubles,
2. one item of product 1 for 2 rubles,
3. one item of product 1 for 2 rubles,
4. one item of product 2 for 1 ruble (she can use the discount because 3 items are already purchased),
5. one item of product 1 for 1 ruble (she can use the discount because 4 items are already purchased).

In total, she spends 8 rubles. It can be proved that it is impossible to spend less.

In the second example Lena can purchase the products in the following way:

1. one item of product 1 for 2 rubles,
2. two items of product 2 for 2 rubles for each,
3. one item of product 5 for 2 rubles,
4. one item of product 3 for 1 ruble,
5. two items of product 4 for 1 ruble for each,
6. one item of product 1 for 1 ruble.

In total, she spends 12 rubles.

E. Game with Cards

time limit per test: 2.5 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

The Alice's computer is broken, so she can't play her favorite card game now. To help Alice, Bob wants to answer n her questions.

Initially, Bob holds one card with number 0 in the left hand and one in the right hand. In the i-th question, Alice asks Bob to replace a card in the left or right hand with a card with number k_i (Bob chooses which of two cards he changes, Bob must replace exactly one card).

After this action, Alice wants the numbers on the left and right cards to belong to given segments (segments for left and right cards can be different). Formally, let the number on the left card be x, and on the right card be y. Then after the i-th swap the following conditions must be satisfied: $a_{l,i} \le x \le b_{l,i}$, and $a_{r,i} \le y \le b_{r,i}$.

Please determine if Bob can answer all requests. If it is possible, find a way to do it.

Input

The first line contains two integers n and m ($2 \le n \le 100\,000$, $2 \le m \le 10^9$) — the number of questions and the maximum possible value on the card.

Then n queries are described. Every description contains 3 lines.

The first line of the description of the i-th query contains a single integer k_i ($0 \le k_i \le m$) — the number on a new card.

The second line of the description of the i-th query contains two integers $a_{l,i}$ and $b_{l,i}$ ($0 \le a_{l,i} \le b_{l,i} \le m$) — the minimum and maximum values of the card at the left hand after the replacement.

The third line of the description of the i-th query contains two integers $a_{r,i}$ and $b_{r,i}$ ($0 \le a_{r,i} \le b_{r,i} \le m$) — the minimum and maximum values of the card at the right hand after the replacement.

Output

At the first line, print "Yes", if Bob can answer all queries, and "No" otherwise.

If Bob can answer all n queries, then at the second line print n numbers: a way to satisfy all requirements. If in i-th query Bob needs

to replace the card in the left hand, print 0, otherwise print 1. If there are multiple answers, print any.

Examples

input
2 10 3 0 3 0 2 2 0 4 0 2
output
Yes 0 1

input
2 10 3 0 3 0 2 2 3 4 0 1
output
No

input
5 10 3 0 3 0 3 7 4 7 1 3 2 2 3 3 7 8 1 8 1 8 6 1 6 7 10
output
Yes 1 0 0 1 0

F. Strange Array

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

Vasya has an array of n integers $a_1, a_2, \ldots, a_n$. Vasya thinks that all numbers in his array are strange for some reason. To calculate how strange the i-th number is, Vasya created the following algorithm.

He chooses a subsegment $a_l, a_{l+1}, \ldots, a_r$, such that $1 \le l \le i \le r \le n$, sort its elements in increasing order in his head (he can arrange equal elements arbitrary). After that he finds the center of the segment. The center of a segment is the element at position $(l + r)/2$, if the length of the segment is odd, and at position $(l + r + 1)/2$ otherwise. Now Vasya finds the element that was at position i before the sorting, and calculates the distance between its current position and the center of the subsegment (the distance between the elements with indices j and k is $|j - k|$).

The strangeness of the number at position i is the maximum distance among all suitable choices of l and r.

Vasya wants to calculate the strangeness of each number in his array. Help him to do it.

Input

The first line contains a single integer n ($1 \le n \le 200\,000$) — the size of the array.

The second line contains n integers $a_1, a_2, \ldots, a_n$ ($1 \le a_i \le n$) — Vasya's array.

Output

Print a single line with n numbers. The i-th of them must be equal to the strangeness of the i-th element of the array.

Examples

input

5 5 4 3 2 1
output
2 1 1 2 2

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

Note

In the first example:

1. For the first position we choose the segment from 1 to 5. After sorting, it looks like $[1, 2, 3, 4, 5]$, the center is 3. The distance from the center to 5 is 2.
2. For the second position we choose the segment from 2 to 4.
3. For the third position we choose the segment from 3 to 5.
4. For the fourth position we choose the segment from 1 to 4. After sorting, it looks like $[2, 3, 4, 5]$, the center is 4. The distance from the center to 2 is 2.
5. For the fifth position we choose the segment from 1 to 5.