Codeforces Round #258 (Div. 2)

A. Game With Sticks

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

After winning gold and silver in IOI 2014, Akshat and Malvika want to have some fun. Now they are playing a game on a grid made of n horizontal and m vertical sticks.

An *intersection point* is any point on the grid which is formed by the intersection of one horizontal stick and one vertical stick.

In the grid shown below, $n = 3$ and $m = 3$. There are $n + m = 6$ sticks in total (horizontal sticks are shown in red and vertical sticks are shown in green). There are $n \cdot m = 9$ intersection points, numbered from 1 to 9.

The rules of the game are very simple. The players move in turns. Akshat won gold, so he makes the first move. During his/her move, a player must choose any remaining intersection point and remove from the grid all sticks which pass through this point. A player will lose the game if he/she cannot make a move (i.e. there are no intersection points remaining on the grid at his/her move).

Assume that both players play optimally. Who will win the game?

Input

The first line of input contains two space-separated integers, n and m ($1 \le n, m \le 100$).

Output

Print a single line containing "Akshat" or "Malvika" (without the quotes), depending on the winner of the game.

Examples

input
2 2
output
Malvika

input
2 3
output
Malvika

input
3 3
output
Akshat

Note

Explanation of the first sample:

The grid has four intersection points, numbered from 1 to 4.

If Akshat chooses intersection point 1, then he will remove two sticks ($1 - 2$ and $1 - 3$). The resulting grid will look like this.

Now there is only one remaining intersection point (i.e. 4). Malvika must choose it and remove both remaining sticks. After her move the grid will be empty.

In the empty grid, Akshat cannot make any move, hence he will lose.

Since all 4 intersection points of the grid are equivalent, Akshat will lose no matter which one he picks.

B. Sort the Array

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

Being a programmer, you like arrays a lot. For your birthday, your friends have given you an array a consisting of n **distinct** integers.

Unfortunately, the size of a is too small. You want a bigger array! Your friends agree to give you a bigger array, but only if you are able to answer the following question correctly: is it possible to sort the array a (in increasing order) by reversing **exactly one** segment of a? See definitions of segment and reversing in the notes.

Input

The first line of the input contains an integer n ($1 \le n \le 10^5$) — the size of array a.

The second line contains n distinct space-separated integers: $a[1], a[2], \ldots, a[n]$ ($1 \le a[i] \le 10^9$).

Output

Print "yes" or "no" (without quotes), depending on the answer.

If your answer is "yes", then also print two space-separated integers denoting start and end (start must not be greater than end) indices of the segment to be reversed. If there are multiple ways of selecting these indices, print any of them.

Examples

input
3 3 2 1
output
yes 1 3

input
4 2 1 3 4
output
yes 1 2

input
4 3 1 2 4
output
no

input
2 1 2
output
yes 1 1

Note

Sample 1. You can reverse the entire array to get $[1, 2, 3]$, which is sorted.

Sample 3. No segment can be reversed such that the array will be sorted.

Definitions

A segment $[l, r]$ of array a is the sequence $a[l], a[l + 1], \ldots, a[r]$.

If you have an array a of size n and you reverse its segment $[l, r]$, the array will become:

$a[1], a[2], \ldots, a[l - 2], a[l - 1], a[r], a[r - 1], \ldots, a[l + 1], a[l], a[r + 1], a[r + 2], \ldots, a[n - 1], a[n]$.

C. Predict Outcome of the Game

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

There are n games in a football tournament. Three teams are participating in it. Currently k games had already been played.

You are an avid football fan, but recently you missed the whole k games. Fortunately, you remember a guess of your friend for these k games. Your friend did not tell exact number of wins of each team, instead he thought that absolute difference between number of wins of first and second team will be d_1 and that of between second and third team will be d_2.

You don't want any of team win the tournament, that is each team should have the same number of wins after n games. That's why you want to know: does there exist a valid tournament satisfying the friend's guess such that no team will win this tournament?

Note that outcome of a match can not be a draw, it has to be either win or loss.

Input

The first line of the input contains a single integer corresponding to number of test cases t ($1 \le t \le 10^5$).

Each of the next t lines will contain four space-separated integers n, k, d_1, d_2 ($1 \le n \le 10^{12}$; $0 \le k \le n$; $0 \le d_1, d_2 \le k$) — data for the current test case.

Output

For each test case, output a single line containing either "yes" if it is possible to have no winner of tournament, or "no" otherwise (without quotes).

Examples

input
5 3 0 0 0 3 3 0 0 6 4 1 0 6 3 3 0 3 3 3 2
output
yes yes yes no no

Note

Sample 1. There has not been any match up to now ($k = 0, d_1 = 0, d_2 = 0$). If there will be three matches (1-2, 2-3, 3-1) and each team wins once, then at the end each team will have 1 win.

Sample 2. You missed all the games ($k = 3$). As $d_1 = 0$ and $d_2 = 0$, and there is a way to play three games with no winner of tournament (described in the previous sample), the answer is "yes".

Sample 3. You missed 4 matches, and $d_1 = 1, d_2 = 0$. These four matches can be: 1-2 (win 2), 1-3 (win 3), 1-2 (win 1), 1-3 (win 1). Currently the first team has 2 wins, the second team has 1 win, the third team has 1 win. Two remaining matches can be: 1-2 (win 2), 1-3 (win 3). In the end all the teams have equal number of wins (2 wins).

D. Count Good Substrings

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

We call a string *good*, if after merging all the consecutive equal characters, the resulting string is palindrome. For example, "aabba" is good, because after the merging step it will become "aba".

Given a string, you have to find two values:

1. the number of good substrings of even length;
2. the number of good substrings of odd length.

Input

The first line of the input contains a single string of length n ($1 \le n \le 10^5$). Each character of the string will be either 'a' or 'b'.

Output

Print two space-separated integers: the number of good substrings of even length and the number of good substrings of odd length.

Examples

input
bb
output
1 2

input
baab
output
2 4

input
babb
output
2 5

input
babaa
output
2 7

Note

In example 1, there are three good substrings ("b", "b", and "bb"). One of them has even length and two of them have odd length.

In example 2, there are six good substrings (i.e. "b", "a", "a", "b", "aa", "baab"). Two of them have even length and four of them have odd length.

In example 3, there are seven good substrings (i.e. "b", "a", "b", "b", "bb", "bab", "babb"). Two of them have even length and five of them have odd length.

Definitions

A substring $s[l, r]$ $(1 \le l \le r \le n)$ of string $s = s_1 s_2 \ldots s_n$ is string $s_l s_{l+1} \ldots s_r$.

A string $s = s_1 s_2 \ldots s_n$ is a palindrome if it is equal to string $s_n s_{n-1} \ldots s_1$.

E. Devu and Flowers

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

Devu wants to decorate his garden with flowers. He has purchased n boxes, where the i-th box contains f_i flowers. All flowers in a single box are of the same color (hence they are indistinguishable). Also, no two boxes have flowers of the same color.

Now Devu wants to select **exactly** s flowers from the boxes to decorate his garden. Devu would like to know, in how many different ways can he select the flowers from each box? Since this number may be very large, he asks you to find the number modulo $(10^9 + 7)$.

Devu considers two ways different if there is at least one box from which different number of flowers are selected in these two ways.

Input

The first line of input contains two space-separated integers n and s ($1 \le n \le 20$, $0 \le s \le 10^{14}$).

The second line contains n space-separated integers $f_1, f_2, \ldots f_n$ ($0 \le f_i \le 10^{12}$).

Output

Output a single integer — the number of ways in which Devu can select the flowers modulo $(10^9 + 7)$.

Examples

input
2 3 1 3
output
2

input
2 4 2 2
output
1

input
3 5 1 3 2
output
3

Note

Sample 1. There are two ways of selecting 3 flowers: $\{1, 2\}$ and $\{0, 3\}$.

Sample 2. There is only one way of selecting 4 flowers: $\{2, 2\}$.

Sample 3. There are three ways of selecting 5 flowers: $\{1, 2, 2\}$, $\{0, 3, 2\}$, and $\{1, 3, 1\}$.