Problem A. Nasser and Arrays

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Nasser loves playing with arrays. Every time he sees an array of numbers, he decrements the negative numbers in it by one.

Unfortunately, Nasser saw Khaled's array and changed it. Khaled is upset and wants to retrieve his array. Can you help him?

Input

the first line contains an integer number N $(1 \leq N \leq 10^5)$ representing the length of the array.

the second line contains N integer numbers $(A_1, A_2, A_3, ..., A_n)$ representing the changed array $(-10^6 \leq A_i \leq 10^6)$.

Output

Print one line containing N integer numbers representing Khaled's original array.

Examples

standard input	standard output
5 2 -3 6 -9 -2	2 -2 6 -8 -1
4 7 11 2 5	7 11 2 5

Problem B. At Least One Prime Divisor

Input file:	standard input
Output file:	standard output
Time limit:	1 second
Memory limit:	256 megabytes

Given a position integer number N, check whether it has at least one prime divisor.

Note that A is a prime number if it is divisible by only two different numbers: 1 and A.

Input

The only input line contains number $N(1 \leq N \leq 10^{18})$.

Output

Print **YES** or **NO** according to the problem description.

Example

standard input	standard output
12	YES

Problem C. Three Friends

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2 seconds
Memory limit:	512 megabytes

Nasser, Khaled, and Hossam are living in the same city at houses X, Y, and Z. The city is represented in a weighted directed graph. They decide to meet at one of their houses on next Friday, but they can not agree at which house exactly, so they are asking for your help to decide the best house for them to meet.

The best house for them is the house which is reachable for the other two friends with the minimum weighted subgraph. In case of tie, choose the house with the minimum house number. (See the notes section for better illustration)

Input

The first line contains two integer numbers: $N(3 \le N \le 10^5)$ the number of houses, and $M(0 \le M \le 10^5)$ the number of roads.

The ith line of the next M lines contain three integer numbers a_i, b_i, and w_i $(1 \le a_i, b_i \le N, a_i \ne b_i, 0 \le w_i \le 10^5)$ representing a directed road from house a_i to house b_i with weight w_i.

The last line contains three integer numbers X, Y, and Z $(1 \le X, Y, Z \le N, X \ne Y \ne Z)$ representing the houses numbers for the three friends.
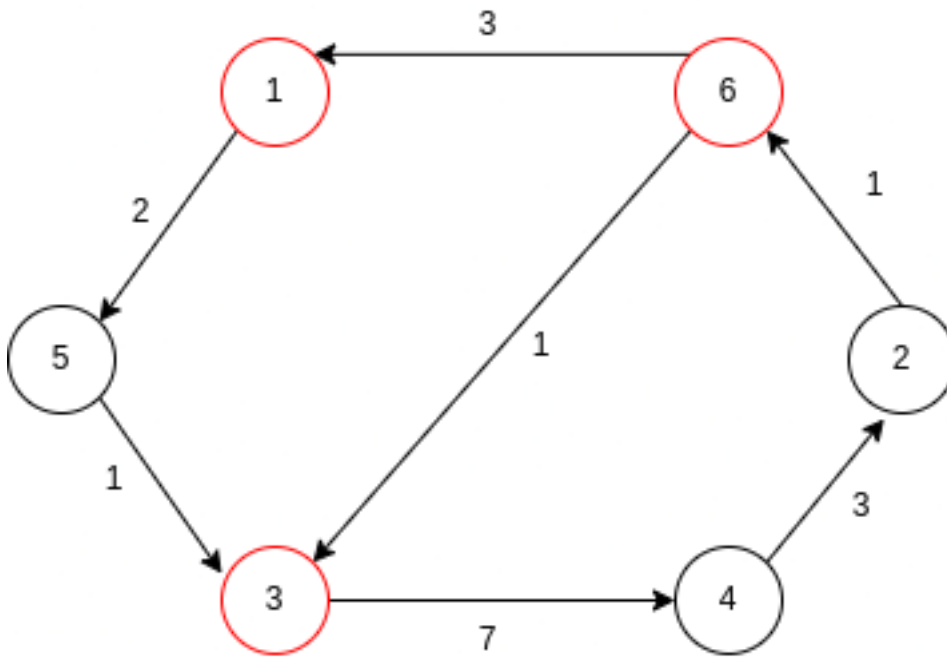
Output

If there is no solution, print -1.

Else, print two integer numbers: the house number and the weight of the minimum weighted subgraph.
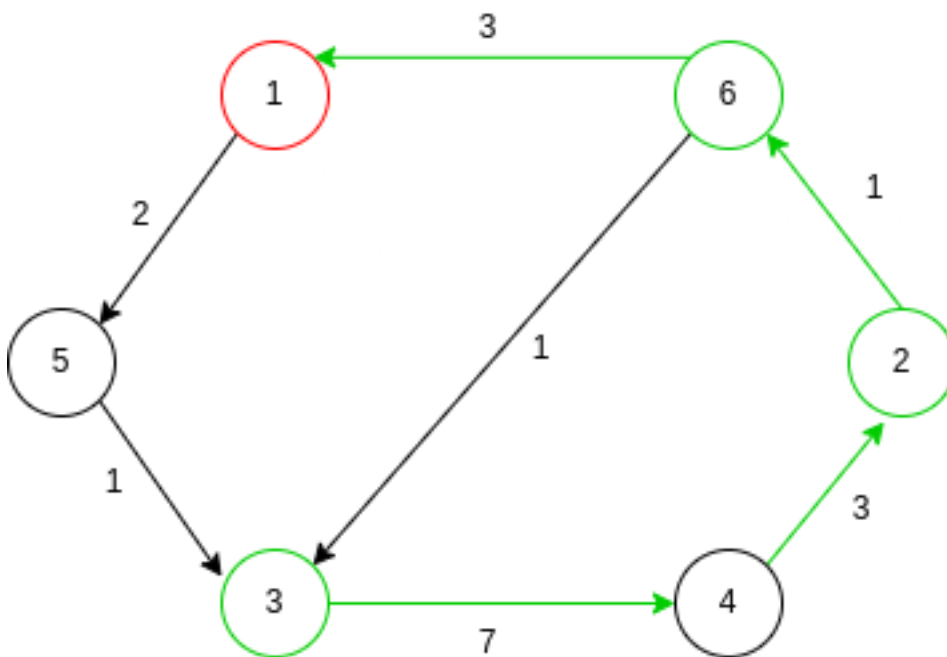
Examples

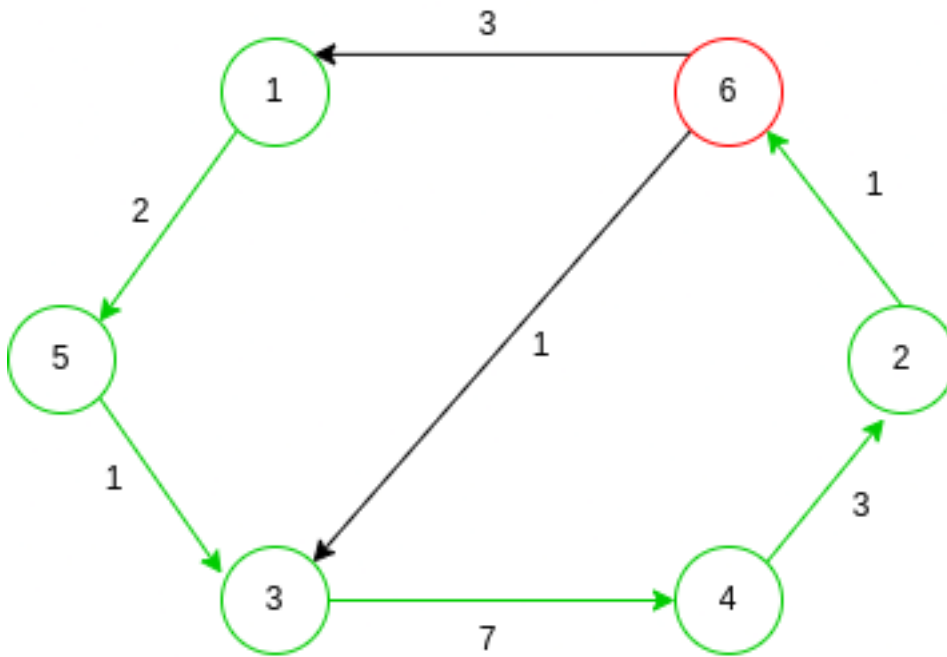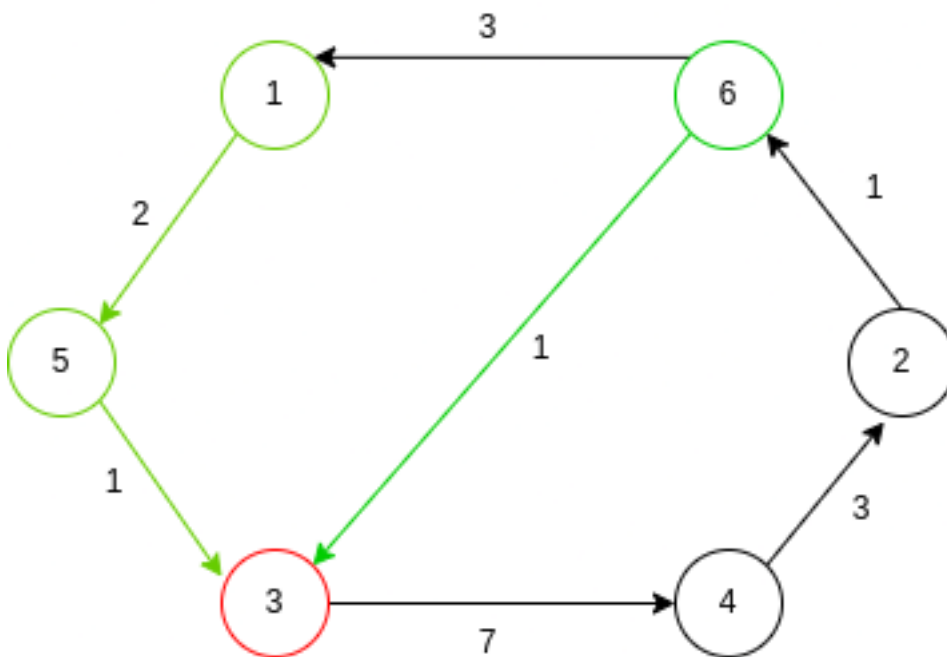| standard input	standard output
6 7 1 5 2 2 6 1 3 4 7 4 2 3 5 3 1 6 1 3 6 3 1 6 1 3	3 4
3 1 1 2 10 1 2 3	-1

Note

First Test Case:

If they meet at house 1, the weight of minimum weighted subgraph is 14

If they meet at house 6, the weight of minimum weighted subgraph is also 14

If they meet at house 3, the weight of minimum weighted subgraph is only 4, which is the answer

Problem D. Good Array

Input file:	standard input
Output file:	standard output
Time limit:	1 second
Memory limit:	256 megabytes

Good array is the array which does not contain any equal adjacent elements.

Given an integer array A of length N, you are asked to do some operations (possibly zero) to make the array good. One operation is to remove two equal adjacent elements, and concatenate the rest of the array.

$A : (1, 2, 2, 3, 4)$

A after one operation : $(1, 3, 4)$

Input

The first line contains one integer number $N(1 \leq N \leq 10^5)$.

The second line contains N integers $A_1, A_2, ..., A_N$ $(-10^4 \leq A_i \leq 10^4)$.

Output

The output should be two lines.

For the first line, print the length of the final good array.

For the second line, print the element of the final good array.

Examples

standard input	standard output
6 1 3 2 2 3 4	2 1 4
4 2 2 3 3	0

Problem E. Lazy Writer

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Nasser is a writer. He has N hard-copy books, and he wants to write them on the computer to convert it into PDF files. The ith book of them has W_i words.

Nasser has only H hours to finish all books. Each hour, he chooses some book and write K words from it. If the chosen book has less than K words, he writes them and will not start another book during this hour.

Nasser is kinda lazy, so he wants to finish all the books within H hours, but with minimum possible words-per-hour writing speed K

Input

The first line contains two integer numbers $N(1 \le N \le 10^5)$, and $H(N \le H \le 10^9)$.

The second line contains N integers $W_1, W_2, ..., W_N$ $(1 \le W_i \le 10^9)$.

Output

Print the minimum possible words-per-hour writing speed K.

Example

standard input	standard output
4 8 2 7 6 11	4

Problem F. Longest Family Chain

Input file:	standard input
Output file:	standard output
Time limit:	1 second
Memory limit:	256 megabytes

Given N strings representing names for some people. $person_1$ is a parent for $person_2$ if and only if you can remove exactly one character from $name_2$ without changing the order to get $name_1$. For example, "abcd" is a parent for "acd". Find the length of the longest family chain.

Input

The first line contains one integer number $N(1 \leq N \leq 10^4)$.

The ith line of the next N lines contains a string consisting of small English letters $name_i(1 \leq |name_i| \leq 20)$ representing the name of the ith person

Output

Print one integer number representing the length of the longest family chain

Examples

standard input	standard output
6 a n na nma nza nzma	4
3 abcd xyz anmz	1

Note

One of the longest family chains for the first test case is ("a", "na", "nma", "nzma")

Problem G. Reverse Problem

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2 seconds
Memory limit:	256 megabytes

Nasser gives Zaki a simple problem. Given a string of N characters, print all $(N-2)$ three-letter continuous substrings. For example, if the string is "abcdef", Zaki should print ("abc", "bcd", "cde", "def").

Zaki finds this problem too easy, so Nasser decides to reverse the problem to make more challenging for Zaki. Given $(N-2)$ three-letter substrings, find any string of length N corresponding to the given set of three-letter substrings. Help Zaki to solve this problem.

Input

The first line of input contains one integer number $N(3 \leq N \leq 10^5)$ representing the length of the desired string.

Each one of the next $(N-2)$ lines contains a three-letter substring. The substrings consist of lowercase English letters.

Output

If there is no solution print **NO**

Else, print **YES** in the first line, and the N-characters desired string in the second line.

Examples

standard input	standard output
7 xzx xyx xyx zxy yxz	YES xyxzxyx
5 abc def xyz	NO

Problem H. 2D Points

Input file:	standard input
Output file:	standard output
Time limit:	1 second
Memory limit:	256 megabytes

Your given N 2D points (x, y), and an integer K. The points are in ascending order by x-values. Print the the maximum value of $(y_i + y_j + |x_i - x_j|)$ where $(|x_i - x_j| \leq K)$ and $(1 \leq i < j \leq N)$. If there is no pair of points that satisfy the conditions, print -1.

Input

The first line contains two integer numbers $N(1 \leq N \leq 10^5)$ and $K(0 \leq K \leq 10^8)$.

The ith line of the next N lines contains two integer numbers x_i and $y_i(0 \leq x_i, y_i \leq 10^8)$ representing the coordinates of the ith point. The points are ordered ascendingly by x-values.

Output

Print one integer number representing the answer as described.

Examples

standard input	standard output
4 3 0 3 3 2 4 0 4 10	13
3 3 0 0 4 5 8 2	-1

Problem I. Sum Game

Input file: standard input
Output file: standard output
Time limit: 0.25 seconds
Memory limit: 256 megabytes

Nasser and Hoss are bored of studying math, so they decide to play with numbers.

The game is as following:

- Each of them selects an integer number (A and B).

- They sum up all numbers between A and B (inclusive).

- If the sum is even Nasser wins, otherwise Hoss wins.

Given the two integer numbers that Nasser and Hoss select, Help them to know the winner.

Input

One line containing two integers numbers a and b ($1 \leq A, B \leq 10^9$).

Output

Print one line containing the winner **Nasser** or **Hoss**.

Examples

standard input	standard output
5 11	Nasser
2 4	Hoss

Problem J. Large Arrays

Input file:	standard input
Output file:	standard output
Time limit:	1 second
Memory limit:	256 megabytes

Your are given two one-indexed integer arrays A and B described by the following formulas:

$A[i] = i * X$ where $(1 \leq i \leq N)$, N in the length of A array, and X is a positive integer constant.

$B[i] = i * Y$ where $(1 \leq i \leq M)$, M in the length of B array, and Y is a positive integer constant.

You are asked to find the median of these two arrays merged together. For example, if $N = 3, X = 2, M = 2, Y = 5$, array A is $[2, 4, 6]$, and array B is $[5, 10]$. By merging arrays A and B: $[2, 4, 5, 6, 10]$, the median is 5.

Input

The first line contains two integer numbers $N(1 \leq N \leq 10^{10})$ and $X(1 \leq X \leq 10^5)$.

The second line contains two integer numbers $M(1 \leq M \leq 10^{10})$ and $Y(1 \leq Y \leq 10^5)$.

Output

Print one float number with **exactly one digit after the floating point** representing the median of the two arrays merged together.

Examples

standard input	standard output
3 2 2 5	5.0
4 5 4 7	14.5

Problem K. Longest Subarray

Input file:	standard input
Output file:	standard output
Time limit:	1 second
Memory limit:	256 megabytes

You are given an integer array A of length N, and an integer K. Your task is to find the longest length of **non-empty** contiguous subarray whose sum equals to K. If there is no such subarray, the answer is 0.

The subarray of A is a contiguous part of the array A i. e. the array $(A_i, A_{i+1}, ..., A_j)$ for some $(1 \le i \le j \le N)$.

Input

The first line contains two integers N $(1 \le N \le 10^5)$ and K $(-10^9 \le K \le 10^9)$.

The second line contains N integers $A_1, A_2, ..., A_N$ $(-10^4 \le A_i \le 10^4)$.

Output

Print one integer number representing the answer for this problem.

Example

standard input	standard output
5 7 1 5 2 2 3	3