Freshman Qualifier 1 Round 2

Problem A: HQ9+

HQ9+ is a joke programming language which has only four one-character instructions:

- "H" prints "Hello, World!",
- "Q" prints the source code of the program itself,
- "9" prints the lyrics of "99 Bottles of Beer" song,
- "+" increments the value stored in the internal accumulator.

Instructions "H" and "Q" are case-sensitive and must be uppercase. The characters of the program which are not instructions are ignored.
You are given a program written in HQ9+. You have to figure out whether executing this program will produce any output.

Input

The input will consist of a single line p which will give a program in HQ9+. String p will contain between 1 and 100 characters, inclusive. ASCII-code of each character of p will be between 33 (exclamation mark) and 126 (tilde), inclusive.

Output

Output "YES", if executing the program will produce any output, and "NO" otherwise.

Test Cases

input	**output**
Hi!	YES

input	**output**
Codeforces	NO

Problem B: Ultra-Fast Mathematician

Sauban was an extremely gifted student. He was great at everything including Combinatorics, Algebra, Number Theory, Geometry, Calculus, etc. He was not only smart but extraordinarily fast! He could manage to sum 10^{18} numbers in a single second.

One day in 230 AD Sauban was trying to find out if any one can possibly do calculations faster than him. As a result he made a very great contest and asked every one to come and take part.

In his contest he gave the contestants many different pairs of numbers. Each number is made from digits 0 or 1. The contestants should write a new number corresponding to the given pair of numbers. The rule is simple: The i-th digit of the answer is 1 if and only if the i-th digit of the two given numbers differ. In the other case the i-th digit of the answer is 0.

Sauban made many numbers and first tried his own speed. He saw that he can perform these operations on numbers of length (length of a number is number of digits in it) in a glance! He always gives correct answers so he expects the contestants to give correct answers, too. He is a good fellow so he won't give anyone very big numbers and he always gives one person numbers of same length.

Now you are going to take part in Sauban's contest. See if you are faster and more accurate.

Input

There are two lines in each input. Each of them contains a single number. It is guaranteed that the numbers are made from 0 and 1 only and that their length is same. The numbers may start with 0. The length of each number doesn't exceed 100.

Output

Write one line — the corresponding answer. Do not omit the leading 0s.

Test Cases

input	output
1010100 0100101	1110001

input	output
000 111	111

input	output
1110 1010	0100

Problem C: Epic Game

Simon and Antisimon play a game. Initially each player receives one fixed positive integer that doesn't change throughout the game. Simon receives number a and Antisimon receives number b. They also have a heap of n stones. The players take turns to make a move and Simon starts. During a move a player should take from the heap the number of stones equal to the greatest common divisor of the fixed number he has received and the number of stones left in the heap. A player loses when he cannot take the required number of stones (i. e. the heap has strictly less stones left than one needs to take).
Your task is to determine by the given a, b and n who wins the game.

Input

The only string contains space-separated integers a, b and n ($1 <= a, b, n <= 100$) — the fixed numbers Simon and Antisimon have received correspondingly and the initial number of stones in the pile.

Output

If Simon wins, print "0" (without the quotes), otherwise print "1" (without the quotes).

Test Cases

input	output
3 5 9	0

input	output
1 1 100	1

Note

The greatest common divisor of two non-negative integers a and b is such maximum positive integer k, that a is divisible by k without remainder and similarly, b is divisible by k without remainder. Let gcd(a, b) represent the operation of calculating the greatest common divisor of numbers a and b. Specifically, gcd(x, 0) = gcd(0, x) = x.
In the first sample the game will go like that:

- Simon should take gcd(3, 9) = 3 stones from the heap. After his move the heap has 6 stones left.
- Antisimon should take gcd(5, 6) = 1 stone from the heap. After his move the heap has 5 stones left.
- Simon should take gcd(3, 5) = 1 stone from the heap. After his move the heap has 4 stones left.
- Antisimon should take gcd(5, 4) = 1 stone from the heap. After his move the heap has 3 stones left.
- Simon should take gcd(3, 3) = 3 stones from the heap. After his move the heap has 0 stones left.
- Antisimon should take gcd(5, 0) = 5 stones from the heap. As 0 ¡ 5, it is impossible and Antisimon loses.

In the second sample each player during each move takes one stone from the heap. As n is even, Antisimon takes the last stone and Simon can't make a move after that.

Problem D: Before an Exam

Tomorrow Amir has a Biology exam. He does not like this subject much, but d days ago he learnt that he would have to take this exam. Amir's strict parents made him prepare for the exam immediately, for this purpose he has to study not less than minTime_i and not more than maxTime^i hours per each i-th day. Moreover, they warned Amir that a day before the exam they would check how he has followed their instructions.

So, today is the day when Amir's parents ask him to show the timetable of his preparatory studies. But the boy has counted only the sum of hours sumTime spent him on preparation, and now he wants to know if he can show his parents a timetable shedule with d numbers, where each number shedulei stands for the time in hours spent by Amir each i-th day on biology studies, and satisfying the limitations imposed by his parents, and at the same time the sum total of all schedule_i should equal to sumTime.

Input

The first input line contains two integer numbers d, sumTime ($1 <= d <= 30, 0 <= sumTime <= 240$) — the amount of days, during which Amir studied, and the total amount of hours, spent on preparation. Each of the following d lines contains two integer numbers minTime_i, maxTime_i ($0 <= minTimei <= maxTimei <= 8$), separated by a space — minimum and maximum amount of hours that Amir could spent in the i-th day.

Output

In the first line print YES, and in the second line print d numbers (separated by a space), each of the numbers — amount of hours, spent by Amir on preparation in the corresponding day, if he followed his parents' instructions; or print NO in the unique line. If there are many solutions, print any of them.

Test Cases

input	output
1 48 5 7	NO

input	output
2 5 0 1 3 5	YES 1 4

Problem E: Fox and Number Game

Fox Ciel is playing a game with numbers now.
Ciel has n positive integers: x_1, x_2, ..., x_n. She can do the following operation as many times as needed: select two different indexes i and j such that $x_i > x_j$ hold, and then apply assignment $x_i = x_i - x_j$. The goal is to make the sum of all numbers as small as possible.
Please help Ciel to find this minimal sum.

Input

The first line contains an integer n ($2 <= n <= 100$). Then the second line contains n integers: $x_1, x_2, ..., x_n (1 <= xi <= 100)$.

Output

Output a single integer — the required minimal sum.

Test Cases

input	output
2 1 2	2

input	output
3 2 4 6	6

input	output
2 12 18	12

input	output
5 45 12 27 30 18	15

Note

In the first example the optimal way is to do the assignment: $x_2 = x_2 - x_1$.
In the second example the optimal sequence of operations is: $x_3 = x_3 - x_2, x_2 = x_2 - x_1$.