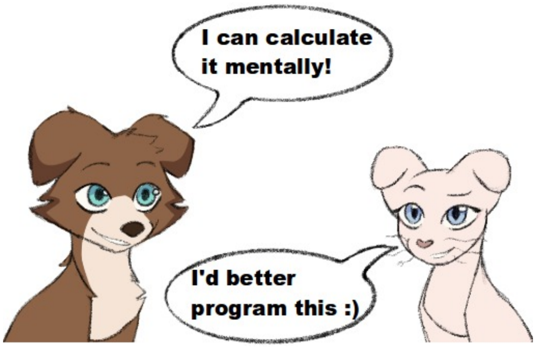
Problem 1001. Arithmetic Revision

Time limit: 0.2 sec
Memory limit: 64 Mb

Pythagoras and Pascalina decided to revise arithmetic. One of them says a positive three-digit number, and the other calculates the sum of the squares of the digits. Pythagoras quickly made all the calculations orally, and the lazy Pascalina decided to write a special program for this.

Write a similar program!



Input

Your program is given a positive three-digit integer N as input.

Output

Output one number − the sum of squares of digits of number N.

Constraints

$100 \leq N \leq 999$

Examples

test	answer
123	14
100	1

Explanations

1. $N = 123$, $S = 1^2 + 2^2 + 3^2 = 14$
2. $N = 100$, $S = 1^2 + 0^2 + 0^2 = 1$

Problem 1002. Game With Three-digit Numbers

Time limit: 0.2 sec
Memory limit: 64 Mb

Pythagoras and Pascalina are playing with three-digit numbers. One of them says a positive three-digit number, and the other has to do the following:

- find the maximum digit in this number and write it to the variable a;
- find the minimum digit in this number and write it to the variable b;
- calculate the value of the expression: $S = a \cdot b \cdot \overline{ab}$

Pythagoras, is doing all the calculations orally, as usual, and the lazy Pascalina is programming.

Write a program that will play this game!

Input

Your program is given a positive three-digit integer N as input.

Output

Output one number − the value of the expression $a \cdot b \cdot \overline{ab}$, where «$a$» is the maximum digit of N, and «b» is the minimum.

Constraints

$100 \le N \le 999$

Examples

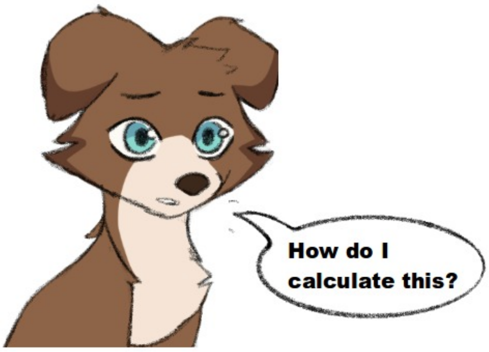
test	answer
123	93
100	0

Explanations

1. $N = 123$, $S = 1 \cdot 3 \cdot 31 = 93$
2. $N = 100$, $S = 1 \cdot 0 \cdot 10 = 0$

Problem 1003. Pythagoras Research

Time limit:	0.2 sec
Memory limit:	64 Mb



The Austrian Pinscher Pythagoras explores the powers of the digits of a number. First of all, he is interested in the powers of digits of three-digit numbers.

Let $N = \overline{abc}$ be a three-digit number, and let a, b and c be the digits of this number. Pythagoras is to calculate the following expression:

$$S = a^{a+1} + b^{b+1} + c^{c+1}.$$

It turned out very quickly that this value can be quite a large number, so Pythagoras asked the cat Pascalina to automate the calculations.

Write a program that will help Pythagoras in his research!

Input

Your program is given a positive three-digit integer N as input.

Output

Output one number S − the sum of the corresponding powers of the digits of the number N.

Constraints

$100 \le N \le 999$

Examples

test	answer
123	90
999	10460353203

Explanations

1. $N = 123$, $S = 1^{1+1} + 2^{2+1} + 3^{3+1} = 90$
2. $N = 999$, $S = 9^{9+1} + 9^{9+1} + 9^{9+1} = 10460353203$

Problem 1004. Two-digit Number Trick

Time limit: 0.2 sec
Memory limit: 64 Mb

Once Pascalina saw a very simple trick with a two-digit number on TikTok. The author of the video asked you to think of any two-digit number and then perform the following operations with it:

- multiply the first digit by three, and the second digit by two, and tell him the sum of these two numbers – S_1;
- multiply the first digit by two, and the second – by five, and tell him the sum of these two numbers – S_2.

After that, the author of the video would quickly guess the number! For example, Pascalina thought of the number 25. Then she had to say the numbers $3 \cdot 2 + 2 \cdot 5 = 16$ and $2 \cdot 2 + 5 \cdot 5 = 29$. Pascalina didn't have any idea how these two numbers could help him to guess the number she had thought of.

Pythagoras, a pinscher-mathematician, came to Pascalina's help. Together they derived formulas and wrote a program that demonstrated the two-digit number trick!

You can write such a program, too. Your program should also allow for the possibility that errors could occur when performing operations with a two-digit number. You will need math!

Input

The first line of input contains a positive integer S_1, the second line contains a positive integer S_2.

Output

Output the two-digit number N, which was given or «-1», if there were errors in the operations with the number.

Examples

test	answer
16 29	25
20 30	-1

Problem 1005. Pythagorean Hypothesis

Time limit:	0.2 sec
Memory limit:	64 Mb

As you know, an integer a is called an exact square if there is such an integer b, that $b^2 = a$. For example, 16 is an exact square because $4 \cdot 4 = 16$.

The pinscher-mathematician Pythagoras hypothesized that any positive integer up to a billion can be represented as the sum of nine exact squares of nonnegative integers. And this hypothesis is correct! While Pythagoras was trying to prove this fact, Pascalina wrote a program to test this hypothesis.

Write a similar program!

Input

Your program is given a positive integer n as input.

Output

Output exactly nine nonnegative integers: a_1, a_2, ..., a_9. These numbers must be such as

$$a_1^2 + a_2^2 + a_3^2 + a_4^2 + a_5^2 + a_6^2 + a_7^2 + a_8^2 + a_9^2 = n.$$

If there are several correct answers, you can output any of them.

Constraints

$1 \le n \le 1\,000\,000\,000$

Examples

test	answer
5	1 2 0 0 0 0 0 0 0
9	1 1 1 1 1 1 1 1 1

Explanations

In the first example $1^2 + 2^2 + 0^2 + 0^2 + 0^2 + 0^2 + 0^2 + 0^2 + 0^2 = 5$. This is not the only correct answer: for example, «1 1 1 1 1 1 0 0 0 0 0» is also a good answer.

In the second example $1^2 + 1^2 + 1^2 + 1^2 + 1^2 + 1^2 + 1^2 + 1^2 + 1^2 = 9$. This is not the only correct answer: for example, «0 0 0 0 0 0 0 0 0 0 3» is also correct.

Problem 1006. Which Digits Were Deleted By Pythagoras?

Time limit: 0.2 sec
Memory limit: 64 Mb

Pinscher-mathematician Pythagoras came up with the following task. He takes two natural four-digit numbers A and B that do not contain zeros in the decimal notation. Then he deletes one digit from each of the numbers and multiplies the results to get number C.

Write a program together with Pascalina the cat to find out which digits Pythagoras deleted.

Input

The first line of input contains number A, the second line – number B, the third line – number C.

Output

In the first line output the number of the digit that Pythagoras deleted from number A. In the second line output the number of the digit which he deleted in number B. Numbering of digits in the number starts from the left, for example, in the number 7819 the first digit is 7, the second is 8, the third is 1, the fourth digit is 9.

If there are several solutions, you can output any of them.

Constraints

- $1111 \le A \le 9999$
- $1111 \le B \le 9999$
- The numbers A and B do not contain zeros in decimal notation
- $111^2 \le C \le 999^2$

Examples

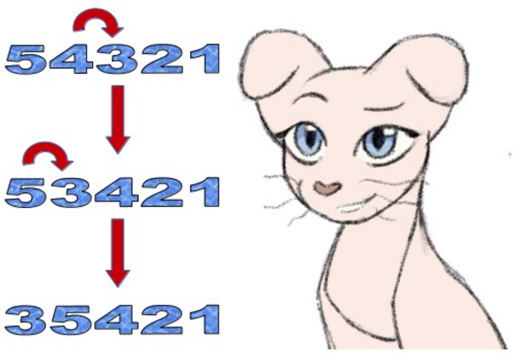
test	answer
1234 5472 58056	4 1
3663 6815 248655	2 3

Explanation

Let's look at the first example. If you remove the 4th digit from $A = 1234$, you will get the number 123. If you remove 1 digit from $B = 7472$, you will get the number 472. Check the product: $123 \cdot 472 = 58056$.

Problem 1007. Pascaline And Five-digit Numbers

Time limit: 0.2 sec
Memory limit: 64 Mb



The cat Pascalina knows five-digit numbers that she doesn't like. She is going to change these numbers by swapping two adjacent digits in each of them twice.

Help Pascalina to write a program that will swap two adjacent digits of a given number N twice. After this operation, you should get a new five-digit number M ($M \neq N$) and this number should be as small as possible.

Input

Your program is given a five-digit number N as input. It is guaranteed that there is one pair of distinct digits in N and at least two digits of N are different from 0.

Output

Output the smallest five-digit number M ($M \neq N$) that can be obtained by swapping a pair of adjacent digits in N twice.

Examples

test	answer
54321	35421
12345	12453

Constraints

$10\,001 \leq N \leq 99\,998$

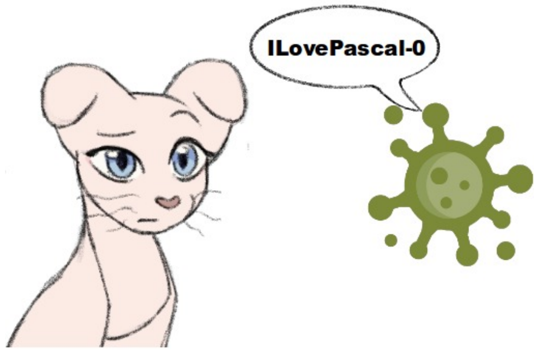
Explanations

1. In the number $N = 54321$, first swap the digits 4 and 3: we get the number 53421, and then swap the digits 5 and 3 to get the number 35421 − this is the smallest number that can be obtained from N, by swapping a pair of adjacent digits twice.
2. In the number $N = 12345$, first swap the digits 3 and 4: we get the number 12435, and then swap digits 3 and 5 to get the number 12453 − this is the smallest number that can be obtained from N, by swapping a pair of adjacent digits twice.

Problem 1008. Virus ILovePascal-0

Time limit:	0.2 sec
Memory limit:	64 Mb

Pascalina is keen on modelling and viruses. One of her first projects was a study of the rate at which a computer virus can infect a memory area. Pascalina invites you to do the same study and modelling!



Let's assume that the memory area is a rectangular table $R_{n \times m}$ with n rows and m columns. Important data are stored in this memory area. From the point of view of this simulation, it is not very important what kind of numbers they are, so let them be **positive** integers.

Pascalina's computer virus «`ILovePascal-0`» first reset some memory cells and then started spreading! In one second, it resets all memory cells adjacent to any cell that already has a zero value. The memory cells R_{i_1,j_1} and R_{i_2,j_2} are adjacent if $|i_1 - i_2| + |j_1 - j_2| = 1$. How many seconds will it take for all the data to be destroyed?

Do this simulation yourself!

Input

You have the initial state of the memory area, which is given as follows: the first line contains the numbers n and m − the size of this area, and each of the next n lines contains m nonnegative integers $R_{i,j}, 1 \le i \le n, 1 \le j \le m$. If $R_{i,j} = 0$, then the cell at the intersection of the i-th row and the j-th column is considered to be infected.

Output

Output one number S − the number of seconds. After S seconds all memory cells should be infected with «`ILovePascal-0`» virus, i.e. they must contain zeros.

Examples

test	answer
3 3 1 2 0 4 5 6 7 8 9	4
3 3 9 8 7 6 0 4 3 2 1	2
5 5 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0	1

Constraints

- $1 \le n \le 250$
- $1 \le m \le 250$
- $0 \le R_{i,j} \le 100$

Problem 1009. Fundamental Constants

Time limit: 0.2 sec
Memory limit: 64 Mb

Pinscher Pythagoras is a cool mathematician. It was he who came up with the concept of `fundamental constants`. And now Pythagoras is studying the compatibility of fundamental constants.

Let's take a closer look at Pythagoras' theory. Let the positive integers A and B be the fundamental constants. Pythagoras says that these constants are **compatible fundamental constants** if there exists such a positive integer n, that $[A] \cdot n$ is divisible by B without remainder. Otherwise, Pythagoras calls these constants **incompatible fundamental constants**. In this definition, $[A] \cdot n$ means the positive integer that is obtained if we write the number A n times in a row, for example, $[10] \cdot 3 = 101010$.

Look at the interesting fact that Pythagoras managed to establish.
It is obvious that number 10 is a fundamental constant, because it is the basis of the most common number system. Also, everyone knows the fundamental constant 42 – «Answer to the Ultimate Question of Life, the Universe, and Everything». It turns out that these constants are compatible according to the Pythagorean theory! Pythagoras invites you to verify this, and also to check the compatibility of a number of fundamental constants.

Input

Your program is given two fundamental constants – A and B.

Output

If the given fundamental constants are compatible, output the minimum number that can be obtained by writing the fundamental constant A a certain number of times in a row. This number must be divisible without remainder by the fundamental constant B.

If the given fundamental constants are incompatible, output the message «`Incompatible fundamental constants`» without errors.

Examples

test	answer
10 42	101010
1234 13	123412341234
2 10	Incompatible fundamental constants

Constraints

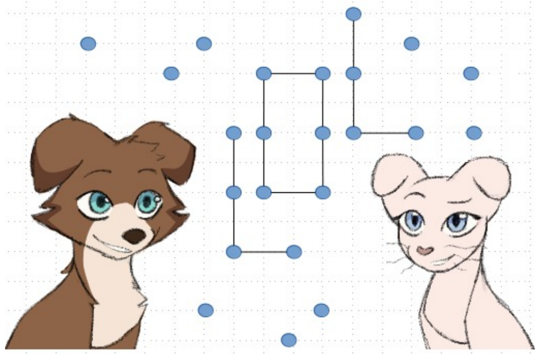
- $1 \le A \le 1\,000\,000\,000$
- $1 \le B \le 100\,000$

Problem 1010. Simple Polygon

Time limit:	0.5 sec
Memory limit:	64 Mb

A **Simple Polygon** is a polygon whose boundary has no self-intersections or self-tangents. Pythagoras, the mathematician pinscher, and Pascalina, the programmer cat, have several points on the plane.

Help them construct a simple polygon of maximum area with vertices at the given points!



Input

The first line of input contains the number n — the number of points on the plane. The next n lines contain pairs of numbers x_i and y_i — the coordinates of the i-th point. It is guaranteed that no two points coincide.

Output

If it is impossible to construct a simple polygon with the vertices of the given points, output «No» in a single line. Otherwise, output «Yes» in the first line, and in the next line output the permutation of numbers from 1 to n — in the order in which the vertices of the polygon should be arranged.

Constraints

- $3 \le n \le 9$
- $-10^8 \le x_i, y_i \le 10^8$

Example

test	answer
5 0 0 2 2 -2 -2 2 -2 -2 2	Yes 1 2 4 3 5

Explanation