A. Counting Sticks

time limit per test: 0.5 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

When new students come to the Specialized Educational and Scientific Centre (SESC) they need to start many things from the beginning. Sometimes the teachers say (not always unfairly) that we cannot even count. So our teachers decided to teach us arithmetics from the start. And what is the best way to teach students add and subtract? — That's right, using counting sticks! An here's our new task:

An expression of counting sticks is an expression of type:

[A sticks][sign +][B sticks][sign =][C sticks] $(1 \le A, B, C)$.

Sign + consists of two crossed sticks: one vertical and one horizontal. Sign = consists of two horizontal sticks. The expression is arithmetically correct if $A + B = C$.

We've got an expression that looks like $A + B = C$ given by counting sticks. Our task is to shift at most one stick (or we can shift nothing) so that the expression became arithmetically correct. Note that we cannot remove the sticks from the expression, also we cannot shift the sticks from the signs + and =.

We really aren't fabulous at arithmetics. Can you help us?

Input

The single line contains the initial expression. It is guaranteed that the expression looks like $A + B = C$, where $1 \le A, B, C \le 100$.

Output

If there isn't a way to shift the stick so the expression becomes correct, print on a single line "`Impossible`" (without the quotes). If there is a way, print the resulting expression. Follow the format of the output from the test samples. Don't print extra space characters.

If there are multiple correct answers, print any of them. For clarifications, you are recommended to see the test samples.

Sample test(s)

input
```
||+|=|||||
```
output
```
|||+|=||||
```

input
```
|||||+||=||
```
output
```
Impossible
```

input
```
|+|=||||||
```
output
```
Impossible
```

input
```
||||+||=||||||
```
output
```
||||+||=||||||
```

Note

In the first sample we can shift stick from the third group of sticks to the first one.

In the second sample we cannot shift vertical stick from + sign to the second group of sticks. So we cannot make a − sign.

There is no answer in the third sample because we cannot remove sticks from the expression.

In the forth sample the initial expression is already arithmetically correct and that is why we don't have to shift sticks.

B. Very Beautiful Number

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

Teacher thinks that we make a lot of progress. Now we are even allowed to use decimal notation instead of counting sticks. After the test the teacher promised to show us a "very beautiful number". But the problem is, he's left his paper with the number in the teachers' office.

The teacher remembers that the "very beautiful number" was strictly positive, didn't contain any leading zeroes, had the length of exactly p decimal digits, and if we move the last digit of the number to the beginning, it grows exactly x times. Besides, the teacher is sure that among all such numbers the "very beautiful number" is minimal possible.

The teachers' office isn't near and the teacher isn't young. But we've passed the test and we deserved the right to see the "very beautiful number". Help to restore the justice, find the "very beautiful number" for us!

Input

The single line contains integers p, x ($1 \le p \le 10^6, 1 \le x \le 9$).

Output

If the teacher's made a mistake and such number doesn't exist, then print on a single line "`Impossible`" (without the quotes). Otherwise, print the "very beautiful number" without leading zeroes.

Sample test(s)

input
```
6 5
```
output
```
142857
```

input
```
1 2
```
output
```
Impossible
```

input
```
6 4
```
output
```
102564
```

Note

Sample 1: $142857 \cdot 5 = 714285$.

Sample 2: The number that consists of a single digit cannot stay what it is when multiplied by 2, thus, the answer to the test sample is "`Impossible`".

C. Dominoes

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

During the break, we decided to relax and play dominoes. Our box with Domino was empty, so we decided to borrow the teacher's dominoes.

The teacher responded instantly at our request. He put nm dominoes on the table as an $n \times 2m$ rectangle so that each of the n rows contained m dominoes arranged horizontally. Each half of each domino contained number (0 or 1).

We were taken aback, and the teacher smiled and said: "Consider some arrangement of dominoes in an $n \times 2m$ matrix. Let's count for each column of the matrix the sum of numbers in this column. Then among all such sums find the maximum one. Can you rearrange the dominoes in the matrix in such a way that the maximum sum will be minimum possible? Note that it is prohibited to change the orientation of the dominoes, they all need to stay horizontal, nevertheless dominoes are allowed to rotate by 180 degrees. As a reward I will give you all my dominoes".

We got even more taken aback. And while we are wondering what was going on, help us make an optimal matrix of dominoes.

Input

The first line contains integers n, m ($1 \leq n, m \leq 10^3$).

In the next lines there is a description of the teachers' matrix. Each of next n lines contains m dominoes. The description of one domino is two integers (0 or 1), written without a space — the digits on the left and right half of the domino.

Output

Print the resulting matrix of dominoes in the format: n lines, each of them contains m space-separated dominoes.

If there are multiple optimal solutions, print any of them.

Sample test(s)

input

```
2 3
01 11 00
00 01 11
```

output

```
11 11 10
00 00 01
```

input

```
4 1
11
10
01
00
```

output

```
11
10
01
00
```

Note

Consider the answer for the first sample. There, the maximum sum among all columns equals 1 (the number of columns is 6, and not 3). Obviously, this maximum can't be less than 1, then such matrix is optimal.

Note that the dominoes can be rotated by 180 degrees.

D. Physical Education and Buns

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

The Physical education teacher at SESC is a sort of mathematician too. His most favorite topic in mathematics is progressions. That is why the teacher wants the students lined up in **non-decreasing** height form an arithmetic progression.

To achieve the goal, the gym teacher ordered a lot of magical buns from the dining room. The magic buns come in two types: when a student eats one magic bun of the first type, his height increases by one, when the student eats one magical bun of the second type, his height decreases by one. The physical education teacher, as expected, cares about the health of his students, so he does not want them to eat a lot of buns. More precisely, he wants the maximum number of buns eaten by some student to be minimum.

Help the teacher, get the maximum number of buns that some pupils will have to eat to achieve the goal of the teacher. Also, get one of the possible ways for achieving the objective, namely, the height of the lowest student in the end and the step of the resulting progression.

Input

The single line contains integer n $(2 \le n \le 10^3)$ — the number of students. The second line contains n space-separated integers — the heights of all students. The height of one student is an integer which absolute value doesn't exceed 10^4.

Output

In the first line print the maximum number of buns eaten by some student to achieve the teacher's aim. In the second line, print two space-separated integers — the height of the lowest student in the end and the step of the progression. Please, pay attention that the step should be non-negative.

If there are multiple possible answers, you can print any of them.

Sample test(s)

input

```
5
-3 -4 -2 -3 3
```

output

```
2
-3 1
```

input

```
5
2 -3 -1 -4 3
```

output

```
1
-4 2
```

Note

Lets look at the first sample. We can proceed in the following manner:

- don't feed the 1-st student, his height will stay equal to -3;
- give two buns of the first type to the 2-nd student, his height become equal to -2;
- give two buns of the first type to the 3-rd student, his height become equal to 0;
- give two buns of the first type to the 4-th student, his height become equal to -1;
- give two buns of the second type to the 5-th student, his height become equal to 1.

To sum it up, when the students line up in non-decreasing height it will be an arithmetic progression: -3, -2, -1, 0, 1. The height of the lowest student is equal to -3, the step of the progression is equal to 1. The maximum number of buns eaten by one student is equal to 2.

E. Lightbulb for Minister

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

The Minister for education is coming! Naturally, nobody wants to perform poorly in front of such a honored guest. However, two hours before the arrival it turned out that one of the classes has a malfunctioning lightbulb — for some reason it doesn't get enough energy. The solution was found quickly: all we've got to do is to change the location of the lightbulb so that it got the maximum amount of energy.

Everybody knows that the power of the lightbulb equals $\frac{C}{\sum_{i=1}^{n} r_i^2}$, where C is some constant value and r_i is the Euclidean distance from the bulb to the i-th generator. Consequently, our task is to minimize $\sum_{i=1}^{n} r_i^2$. Of course, we know the positions of all generators.

The bulb should be on the ceiling of the class. The ceiling of the class is in the form of a strictly convex m-gon (the class itself has the form of a right prism with a strictly convex m-gon at the bottom). Help to find the optimum location for the bulb. Assume that all generators are in the plane of the class ceiling. Consider that the plane of the class ceiling has some Cartesian coordinate system introduced.

Input

The first line contains integer n $(2 \le n \le 10^5)$ — the number of generators. Each of the next n lines contains a pair of integers x_i, y_i, representing the coordinates of the i-th generator in the plane of the class ceiling. It's guaranteed that no two generators have the same location.

The next line contains integer m $(3 \le m \le 10^5)$ — the number of vertexes in the convex polygon that describes the ceiling of the class. Each of the following m lines contains a pair of integers p_i, q_i, representing the coordinates of the i-th point of the polygon in the clockwise order. It's guaranteed that the polygon is strictly convex.

The absolute value of all the coordinates don't exceed 10^6.

Output

Print a single real number — the minimum value of the sum of squares of distances from the generators to the point of the lightbulb's optimal position. The answer will be considered valid if its absolute or relative error doesn't exceed 10^{-4}.

Sample test(s)

input

```
4
3 2
3 4
5 4
5 2
4
3 3
4 4
5 3
4 2
```

output

```
8.00000000
```

Note

We'll define a strictly convex polygon as a convex polygon with the following property: no three vertices of the polygon lie on the same line.