Codeforces Round #224 (Div. 2)

A. Ksenia and Pan Scales

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

Ksenia has ordinary pan scales and several weights of an equal mass. Ksenia has already put some weights on the scales, while other weights are untouched. Ksenia is now wondering whether it is possible to put all the remaining weights on the scales so that the scales were in equilibrium.

The scales is in equilibrium if the total sum of weights on the left pan is equal to the total sum of weights on the right pan.

Input

The first line has a non-empty sequence of characters describing the scales. In this sequence, an uppercase English letter indicates a weight, and the symbol "|" indicates the delimiter (the character occurs in the sequence exactly once). All weights that are recorded in the sequence before the delimiter are initially on the left pan of the scale. All weights that are recorded in the sequence after the delimiter are initially on the right pan of the scale.

The second line contains a non-empty sequence containing uppercase English letters. Each letter indicates a weight which is not used yet.

It is guaranteed that all the English letters in the input data are different. It is guaranteed that the input does not contain any extra characters.

Output

If you cannot put all the weights on the scales so that the scales were in equilibrium, print string "`Impossible`". Otherwise, print the description of the resulting scales, copy the format of the input.

If there are multiple answers, print any of them.

Sample test(s)

input
AC|T L
output
AC|TL

input
|ABC XYZ
output
XYZ|ABC

input
W|T F
output
Impossible

input
ABC| D
output
Impossible

B. Number Busters

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

Arthur and Alexander are number busters. Today they've got a competition.

Arthur took a group of four integers a, b, w, x $(0 \le b < w, 0 < x < w)$ and Alexander took integer c. Arthur and Alexander use distinct approaches to number bustings. Alexander is just a regular guy. Each second, he subtracts one from his number. In other words, he performs the assignment: $c = c - 1$. Arthur is a sophisticated guy. Each second Arthur performs a complex operation, described as follows: if $b \ge x$, perform the assignment $b = b - x$, if $b < x$, then perform two consecutive assignments $a = a - 1$; $b = w - (x - b)$.

You've got numbers a, b, w, x, c. Determine when Alexander gets ahead of Arthur if both guys start performing the operations at the same time. Assume that Alexander got ahead of Arthur if $c \le a$.

Input

The first line contains integers a, b, w, x, c $(1 \le a \le 2 \cdot 10^9, 1 \le w \le 1000, 0 \le b < w, 0 < x < w, 1 \le c \le 2 \cdot 10^9)$.

Output

Print a single integer — the minimum time in seconds Alexander needs to get ahead of Arthur. You can prove that the described situation always occurs within the problem's limits.

Sample test(s)

input
4 2 3 1 6
output
2

input
4 2 3 1 7
output
4

input
1 2 3 2 6
output
13

input
1 1 2 1 1
output
0

C. Arithmetic Progression

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

Everybody knows what an arithmetic progression is. Let us remind you just in case that an *arithmetic progression* is such sequence of numbers $a_1, a_2, ..., a_n$ of length n, that the following condition fulfills:

$$a_2 - a_1 = a_3 - a_2 = a_4 - a_3 = ... = a_{i+1} - a_i = ... = a_n - a_{n-1}.$$

For example, sequences [1, 5], [10], [5, 4, 3] are arithmetic progressions and sequences [1, 3, 2], [1, 2, 4] are not.

Alexander has n cards containing integers. Arthur wants to give Alexander exactly one more card with a number so that he could use the resulting $n+1$ cards to make an arithmetic progression (Alexander has to use all of his cards).

Arthur has already bought a card but he hasn't written a number on it. Help him, print all integers that you can write on a card so that the described condition fulfilled.

Input

The first line contains integer n $(1 \le n \le 10^5)$ — the number of cards. The next line contains the sequence of integers — the numbers on Alexander's cards. The numbers are positive integers, each of them doesn't exceed 10^8.

Output

If Arthur can write infinitely many distinct integers on the card, print on a single line -1.

Otherwise, print on the first line the number of integers that suit you. In the second line, print the numbers in the increasing order. Note that the numbers in the answer can exceed 10^8 or even be negative (see test samples).

Sample test(s)

input
3 4 1 7
output
2 -2 10

input
1 10
output
-1

input
4 1 3 5 9
output
1 7

input
4 4 3 4 5
output
0

input
2 2 4
output
3 0 3 6

D. Ksenia and Pawns

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

Ksenia has a chessboard of size $n \times m$. Each cell of the chessboard contains one of the characters: "<", ">", "^", "v", "#". The cells that contain character "#" are blocked. We know that all chessboard cells that touch the border are blocked.

Ksenia is playing with two pawns on this chessboard. Initially, she puts the pawns on the chessboard. One cell of the chessboard can contain two pawns if and only if the cell is blocked. In other cases two pawns can not stand in one cell. The game begins when Ksenia put pawns on the board. In one move, Ksenia moves each pawn to a side adjacent cell in the direction of arrows painted on the cell on which the corresponding pawn sits (if the pawn sits on "#", it does not move). Assume that Ksenia moves pawns simultaneously (see the second test case).

Of course, Ksenia plays for points. How can one calculate the points per game? Very simply! Let's count how many movements the first pawn made and how many movements the second pawn made, sum these two numbers — it will be the resulting score of the game.

Ksenia wonders: what is the maximum number of points she can earn (for that, she should place the pawns optimally well early in the game). Help her and find that number.

Input

The first line contains two integers, n and m $(1 \le n, m \le 2000)$ — the sizes of the board. Each of the following n lines contains m characters – the board's description. Each character is one of the characters: "<", ">", "^", "v", "#".

It is guaranteed that the border cells of the table are blocked cells (with character "#").

Output

If Ksenia can get infinitely many points, print -1. Otherwise, print the maximum number of points she can get.

Sample test(s)

input
```
1 1
#
```
output
```
0
```

input
```
3 4
####
#>^#
####
```
output
```
3
```

input
```
3 4
####
#><#
####
```
output
```
-1
```

input
```
7 5
#####
##v##
##v##
#####
##^##
##^##
#####
```
output
```
4
```

input
```
7 5
#####
##v##
##v##
##<##
##^##
##^##
```

```
#####
```

output

```
5
```

E. Ksenia and Combinatorics

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

Ksenia has her winter exams. Today she is learning combinatorics. Here's one of the problems she needs to learn to solve.

How many distinct trees are there consisting of n vertices, each with the following properties:

- the tree is marked, that is, the vertices of the tree are numbered from 1 to n;
- each vertex of the tree is connected with at most three other vertices, and at the same moment the vertex with number 1 is connected with at most two other vertices;
- the size of the tree's maximum matching equals k.

Two trees are considered distinct if there are such two vertices u and v, that in one tree they are connected by an edge and in the other tree they are not.

Help Ksenia solve the problem for the given n and k. As the answer to the problem can be very huge you should output it modulo 1000000007 $(10^9 + 7)$.

Input

The first line contains two integers n, k $(1 \le n, k \le 50)$.

Output

Print a single integer — the answer to the problem modulo 1000000007 $(10^9 + 7)$.

Sample test(s)

input
1 1
output
0

input
2 1
output
1

input
3 1
output
3

input
4 2
output
12

Note

If you aren't familiar with matchings, please, read the following link: http://en.wikipedia.org/wiki/Matching_(graph_theory).