Codeforces Beta Round #85 (Div. 1 Only)

A. Petya and Inequiations

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

Little Petya loves inequations. Help him find n positive integers $a_1, a_2, \ldots, a_n$, such that the following two conditions are satisfied:

- $a_1^2 + a_2^2 + \ldots + a_n^2 \geq x$
- $a_1 + a_2 + \ldots + a_n \leq y$

Input

The first line contains three space-separated integers n, x and y ($1 \leq n \leq 10^5$, $1 \leq x \leq 10^{12}$, $1 \leq y \leq 10^6$).

Please do not use the %lld specificator to read or write 64-bit integers in C++. It is recommended to use cin, cout streams or the %I64d specificator.

Output

Print n positive integers that satisfy the conditions, one integer per line. If such numbers do not exist, print a single number "-1". If there are several solutions, print any of them.

Examples

input
5 15 15
output
4 4 1 1 2

input
2 3 2
output
-1

input
1 99 11
output
11

B. Petya and Divisors

time limit per test: 5 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Little Petya loves looking for numbers' divisors. One day Petya came across the following problem:

You are given n queries in the form "x_i y_i". For each query Petya should count how many divisors of number x_i divide none of the numbers $x_{i-y_i}, x_{i-y_i+1}, \ldots, x_{i-1}$. Help him.

Input

The first line contains an integer n ($1 \le n \le 10^5$). Each of the following n lines contain two space-separated integers x_i and y_i ($1 \le x_i \le 10^5$, $0 \le y_i \le i - 1$, where i is the query's ordinal number; the numeration starts with 1).

If $y_i = 0$ for the query, then the answer to the query will be the number of divisors of the number x_i. In this case you do not need to take the previous numbers x into consideration.

Output

For each query print the answer on a single line: the number of positive integers k such that $x_i \bmod k = 0 \ \& \ (\forall j : i - y_i \le j < i) \ x_j \bmod k \ne 0$

Examples

input
6 4 0 3 1 5 2 6 2 18 4 10000 3
output
3 1 1 2 2 22

Note

Let's write out the divisors that give answers for the first 5 queries:

1) 1, 2, 4

2) 3

3) 5

4) 2, 6

5) 9, 18

C. Petya and Spiders

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

Little Petya loves training spiders. Petya has a board $n \times m$ in size. Each cell of the board initially has a spider sitting on it. After one second Petya chooses a certain action for each spider, and all of them humbly perform its commands. There are 5 possible commands: to stay idle or to move from current cell to some of the four side-neighboring cells (that is, one command for each of the four possible directions). Petya gives the commands so that no spider leaves the field. It is allowed for spiders to pass through each other when they crawl towards each other in opposite directions. All spiders crawl simultaneously and several spiders may end up in one cell. Petya wants to know the maximum possible number of spider-free cells after one second.

Input

The first line contains two space-separated integers n and m ($1 \le n, m \le 40, n \cdot m \le 40$) — the board sizes.

Output

In the first line print the maximum number of cells without spiders.

Examples

input
1 1
output
0

input
2 3
output
4

Note

In the first sample the only possible answer is:

s

In the second sample one of the possible solutions is:

rdl
rul

s denotes command "stay idle", `l, r, d, u` denote commands "crawl left", "crawl right", "crawl down", "crawl up", correspondingly.

D. Petya and Coloring

time limit per test: 5 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Little Petya loves counting. He wants to count the number of ways to paint a rectangular checkered board of size $n \times m$ (n rows, m columns) in k colors. Besides, the coloring should have the following property: for any vertical line that passes along the grid lines and divides the board in two non-empty parts the number of distinct colors in both these parts should be the same. Help Petya to count these colorings.

Input

The first line contains space-separated integers n, m and k ($1 \le n, m \le 1000, 1 \le k \le 10^6$) — the board's vertical and horizontal sizes and the number of colors respectively.

Output

Print the answer to the problem. As the answer can be quite a large number, you should print it modulo $10^9 + 7$ (1000000007).

Examples

input
2 2 1
output
1

input
2 2 2
output
8

input
3 2 2
output
40

E. Petya and Rectangle

time limit per test: 5 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Little Petya loves playing with rectangles. Mom bought Petya a rectangle divided into cells $n \times m$ in size (containing n rows, m columns). Petya marked two different cells of the rectangle and now he is solving the following task:

Let's define a *simple path* between those two cells as a sequence of distinct cells $a_1, a_2, \ldots, a_k$, where a_1 and a_k are the two marked cells. Besides, a_i and a_{i+1} are side-neighboring cells of the path ($1 \le i < k$). Let's denote the path length as number k (the sequence length).

Petya's task is to find the longest simple path's length and to print the path. Help him.

Input

The first line contains space-separated integers n and m ($4 \le n, m \le 1000$) — the number of rows and the number of columns in the rectangle, correspondingly. The second line contains space-separated integers x_1 and y_1 — the coordinates of the first marked cell. The third line contains space-separated integers x_2 y_2 — the coordinates of the second marked cell ($1 < x_1, x_2 < n, 1 < y_1, y_2 < m, x_1 \ne x_2, y_1 \ne y_2$).

The coordinates of a marked cell are a pair of integers x y, where x represents the row's number and y represents the column's number. The rows are numbered from top to bottom with consecutive integers from 1 to n. The columns are numbered from the left to the right by consecutive integers from 1 to m.

It is guaranteed that the marked cells are not positioned in one row or column.

Output

In the first line print the length of the found path — k. In the next lines print k pairs of integers, one per line — coordinates of the cells that constitute the found path in the order, in which they follow in the path (the path must go from cell (x_1, y_1) to cell (x_2, y_2)). If there are several solutions, print any of them.

Examples

input
4 4 2 2 3 3

output
15 2 2 1 2 1 1 2 1 3 1 4 1 4 2 4 3 4 4 3 4 2 4 1 4 1 3 2 3 3 3

Note

The statement test is described in the picture: