Problem 1001. Pascaline And Boxes

Time limit: 0.2 sec
Memory limit: 64 Mb

Cat-programmer Pascaline is responsible for loading boxes of computers into a truck, which has the shape of a *rectangular parallelepiped*. All the boxes are identical and each box has the shape of a rectangular parallelepiped.

To ensure the safety of the computers during transportation, the boxes must be placed in a way that meets two requirements:

- the sides of the boxes must be parallel to the sides of the truck body;
- the box can be placed anywhere (subject to the previous requirement), including on top of another box, but all the boxes must be oriented in the same way (i.e. you cannot, for example, place one box «standing», and another one «lying»).

There is a large number of computers, and it may require several trucks to move them all. Therefore, you need to load as many boxes as possible. To optimize the transportation cost of the computers, Pascaline quickly wrote a program that, based on the size of the truck and the size of the box, determines how many boxes will fit in the truck.

Write a program like that!

Input

The first line contains three numbers W, H, D — linear dimensions of the truck body. The second line contains three numbers w, h, d — linear dimensions of the box containing the computer.

Output

Output one number — the maximum number of boxes with computers that can fit in the truck body.

Constraints

$1 \le W \le 1000$, $1 \le H \le 1000$, $1 \le D \le 1000$

$1 \le w \le 1000$, $1 \le h \le 1000$, $1 \le d \le 1000$

Examples

test	answer
100 200 300 1 2 3	1000000
100 200 300 3 2 1	1000000
100 100 1 2 2 2	0

Problem 1002. Pascaline And Fractions

Time limit: 0.2 sec
Memory limit: 64 Mb

Cat-programmer Pascaline, like most children, does not like to add fractions, especially those with different denominators. She is given four positive integers a, b, c and d. The task is to arrange these numbers in such an order that the sum:

$$\frac{a}{b} + \frac{c}{d}$$

is as small as possible.

While Pythagoras could solve this problem orally in a minute, Pascaline wrote a program for it.

Write such a program yourself!

Input

Your program is given four positive integers: a, b, c and d.

Output

Output four numbers, which are permutations of the numbers a, b, c and d, so that the given sum of fractions is the minimum possible. If there are several ways to permute the numbers, output any of them.

Constraints

$1 \le a \le 1\,000\,000\,000$

$1 \le b \le 1\,000\,000\,000$

$1 \le c \le 1\,000\,000\,000$

$1 \le d \le 1\,000\,000\,000$

Examples

test	answer
1 2 3 4	1 3 2 4
5 5 5 5	5 5 5 5

Explanations

In the first example, by arranging the numbers in this way, we get the sum:

$$\frac{1}{3} + \frac{2}{4} = \frac{5}{6},$$

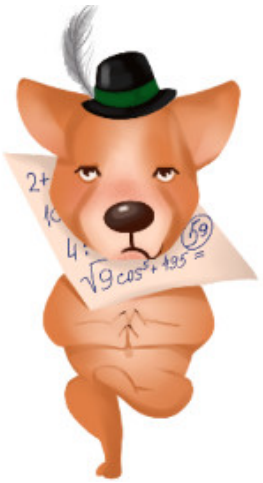
and it is impossible to get a smaller value.

In the second example, the sum will always be equal to:

$$\frac{5}{5} + \frac{5}{5} = 2.$$

Problem 1003. Pythagoras And Notebook

Time limit: 0.2 sec
Memory limit: 64 Mb



One day, a pincher-mathematician named Pythagoras spent the entire day trying to solve a problem... He filled a whole notebook with formulas, but nothing seemed to work. However, the cat-programmer, Pascaline, wrote a small program and quickly found the right answer.

Out of anger and frustration, Pythagoras began tearing up the notebook with the formulas. Every minute, he took the first piece of the notebook he could find and tore it into k pieces. When he calmed down, he found n pieces of the notebook in front of him.

Since Pythagoras was angry, he lost track of time, and now he wonders how long he spent tearing the notebook apart.

Input

Your program is given two integers n and k as input.

Output

Output one integer t — the number of minutes Pythagoras spent destroying the notebook. If there was an error somewhere else and there is no such t, output the number «-1».

Constraints

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

$1 \le k \le 1\,000\,000\,000$

Examples

test	answer
10 4	3
10 3	-1

Problem 1004. Goldbach, Euler, Pythagoras

Time limit: 0.2 sec
Memory limit: 64 Mb

In 1742, the mathematician Christian Goldbach sent a letter to Leonard Euler in which he made the following assumption: *every odd number greater than 5 can be represented as the sum of three primes.*

Euler became interested in the problem and came up with a stronger hypothesis: *every even number greater than two can be represented as the sum of two primes.*

The first statement is called Goldbach's ternary problem, and the second is called Goldbach's binary problem (or Euler's problem).

Pythagoras, the Pinscher-mathematician, solves a much simpler problem. He needs to represent a positive integer N as the sum of any number of primes:

$$N = p_1 + p_2 + p_3 + \cdots + p_k,$$

but the product of these primes must be as large as possible.

Input

Your program is given one positive integer N as input.

Output

Output the primes that sum to N, and their product is the maximum possible.

Constraints

$1 \le N \le 1\,000\,000$

Examples

test	answer
5	2 3
9	3 3 3
10	2 2 3 3

Problem 1005. Pascalina's Courtyards

Time limit: 0.2 sec
Memory limit: 64 Mb

Let's consider a rectangle of size $X \times Y$, from the middle of which a rectangle of size $(X-2) \times (Y-2)$ was cut out. We will call this geometric figure a «*frame*» of size $X \times Y$.

The courtyards where cat Pascaline likes to relax are located inside such frames, and the frame itself is used by the inhabitants of the courtyards for walking. In some courtyards, the coating of the frames is worn out, so Pascalina wants to pave the frames around the courtyards with tiles of size $A \times 1$.

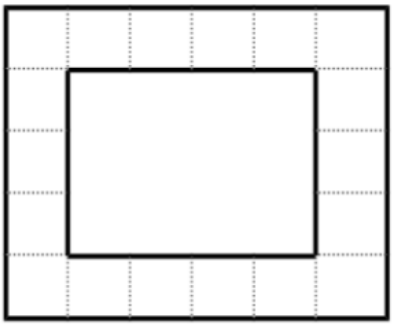


Рис. 1: Frame size 5×6

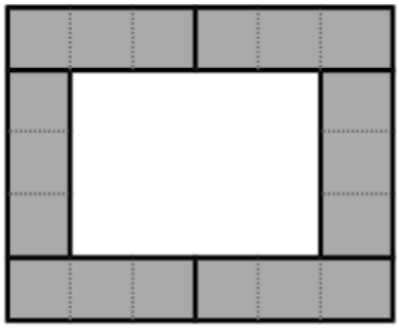


Рис. 2: Frame paving 5×6 frame with 3×1 tiles

You can buy tiles of any size at a building store, but you need to buy tiles of the same size for each patio that will be used to pave the frame. For example, a frame of size 5×6 can be paved with tiles of size 3×1, but not with tiles of size 4×1.

Pascaline decided to write a universal program that will determine by the size of the frame and the size of the tile whether it is possible to pave such a frame with such tiles.

Write such a program!

Input

The first line of input contains two integers X and Y – the size of the frame. The second line contains an integer N – the number of tile types to be analyzed. The third line contains N positive integers. Let's denote the i-th number of the third line by A_i.

Output

Output N lines, the i-th line should contain the word «`YES`» if you can fill the frame with $X \times Y$ with tiles of size $A_i \times 1$, and «`NO`» if it is not possible.

Constraints

$3 \le X \le 10^6$, $3 \le Y \le 10^6$

$1 \le N \le 1000$

$A_i \le 10^6$

Examples

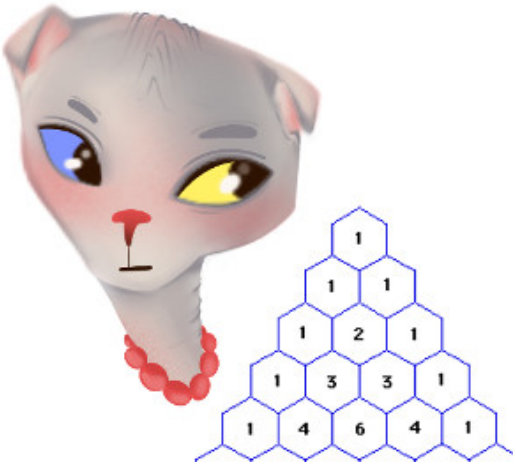
test	answer
5 6 2 3 4	YES NO

Problem 1006. Pascaline And Pascal's Triangle

Time limit: 0.2 sec
Memory limit: 64 Mb

Pascal's triangle − is an infinite triangle of numbers which has the following form:

```
                                1
                            1       1
                        1       2       1
                    1       3       3       1
                1       4       6       4       1
            1       5       10      10      5       1
        1       6       15      20      15      6       1
    1       7       21      35      35      21      7       1
...     ...     ...     ...     ...     ...     ...     ...     ...
```



The lines of Pascal's triangle are numbered starting from zero, the numbers in each line are also numbered started from zero. The zeroth line contains a single number − one, and each following line contains one more number than the previous one. The zeroth and the last number in each line are equal to one, and each of the remaining numbers is equal to the sum of the two numbers in the previous line above it.

Thus, the i-th line contains $i + 1$ numbers. If we represent the j-th element of the i-th line as $a_{i,j}$, then the equation $a_{i,j} = a_{i-1,j-1}+a_{i-1,j}$ holds. Note that this equation is also applies to the outermost elements if we consider the missing elements of the previous line (elements with numbers -1 and i) equal to zero.

The cat programmer Pascaline wants to find out how many odd numbers there are in the n-th line of Pascal's triangle. Initially, she started to draw this triangle, but very soon it became too big to fit on a piece of paper.

Fortunately, Pythagoras, a mathematical pinscher, came to Pascaline's rescue. Together, they discovered the patterns, and Pascaline wrote a program in her favorite programming language, Pascal.

Now, it's your turn to write such a program.

Input

Your programme receives one integer n as input.

Output

Output one number − quantity of odd numbers in the n-th line of Pascal's triangle.

Constraints

$1 \le n \le 10^9$

Examples

test	answer
0	1
1	2
9	4

Problem 1007. Pascaline And Pythagoras' Problem

Time limit: 0.2 sec
Memory limit: 64 Mb

Pythagoras, a mathematician, wrote out all numbers from 1 to N in a series and proposed his friend Pascaline, a cat-programmer, to solve this problem: put a sign «+» or «−» in front of each number, so that the value of the final expression is equal to zero. Even for the most seasoned programmers this is not an easy task — a complete enumeration of variants for big N will work for a very long time!

Help Pascaline! Write a program that solves the Pythagoras problem.

Input

Your programme is given a natural number N as input.

Output

Output a sequence of N symbols «+» or «−» to be placed in front of the numbers from 1 to N so that the sum of the resulting numbers is equal to 0. If the problem has several solutions, you should output any valid answer. If the problem has no solution for the given N, you need to output one word `IMPOSSIBLE`.

Constraints

$1 \le N \le 10^5$

Examples

test	answer
3	++-
2	IMPOSSIBLE

Problem 1008. Pythagoras And Iterations

Time limit: 0.2 sec
Memory limit: 64 Mb

Pythagoras, a mathematician, is researching iterative processes on the set of natural numbers. He needs to get the natural number B ($B > A$) from the natural number A in several iterations:

- he can increase the number by 1 or 2 in one iteration ($A \to A + 1$ or $A \to A + 2$);
- if in the process of such an increase the number suddenly becomes a multiple of C, it will be zeroed.

Write a program for Pythagoras to determine how many iterations it takes to get the number B from the number A.

Input

The input contains three integers: A, B and C, one per line.

Output

Output one number – the minimum number of seconds required to get number B from number A.

Constraints

$1 \le A < B \le 10^9$

$2 \le C \le 10^9$

A is not a multiple of C

B is not a multiple of C

Examples

test	answer
2 7 3	3
4 10 3	4

Explanations

In the first example, you can proceed as follows: $2 \to 4 \to 5 \to 7$. In the second example, you can proceed as follows: $4 \to 5 \to 7 \to 8 \to 10$.

Problem 1009. Pascaline And Dot Puzzle

Time limit: 0.2 sec
Memory limit: 64 Mb

As a young cat, Pascaline liked solving puzzles that involved connecting points with a single line It was fun and easy, and now she has a set of points on the plane, which has the following property: among any four of the given points, three lie on the same line.

Pascaline needs to find a polyline that has the minimum length and passes through all the given points. It is not difficult to solve such a problem on a worksheet. Try to write a program that calculates the length of the shortest polyline that connects the points of the set with the specified property.

Input

The first line of input data contains the number N – the number of points in the set. The next N lines contain the coordinates of the points – pairs of integers x_i, y_i. It is guaranteed that no two points coincide and among any four of the given points, three lie on the same line.

Output

Output the length of the required polyline with the accuracy not less than 10^{-3}.

Constraints

$3 \le N \le 1000$

$|x_i| \le 10\,000$

$|y_i| \le 10\,000$

Examples

test	answer
3 1 0 0 0 -1 0	2.000000
4 0 0 1 0 2 0 1 1	3.41421356237309505

Problem 1010. Pythagoras and the cowpoke

Time limit: 0.5 sec
Memory limit: 64 Mb

Bored during a programming lecture, Pythagoras, a mathematican pinscher, came up with an idea for fun. He drew some cells on a rectangular piece of paper torn from a notebook, took off the cap from his pen and placed it on one of the colored cells. Then, Pythagoras sequentially moved the cap from one colored cell to another colored cell that is in the same row or column as the previous one. Pythagoras selected a certain coloured cell and wanted to move there the cap from the original cell in as few moves as possible.

Write a program that finds the minimum number of moves Pythagoras can move the cap from the initial cell to the target cell, following his rules.

Input

The first line of input contains two integers: the number of lines N and the number of columns M of cells that make up the paper. Each of the next N lines contains M characters:

- `x` (lowercase letter of the Latin alphabet) − a colored cell.
- `.` (full stop) − an empty cell.
- `o` (lowercase letter of the Latin alphabet) − the initial cell.
- `+` (plus) − the target cell.

The input contains exactly one initial cell and exactly one target cell.

Output

Output a single number − the minimum number of cap moves Pythagoras needs to make in order to reach the goal. If it's not possible to reach the target cell accoeding to the given rules, then output -1.

Constraints

$2 \leq M \leq N \leq 1000$

Examples

test	answer
3 2 x+ xx o.	2
4 4 .o.x x.x. .x.x x.+.	-1

Note

Source: *UOI-2013, original title: «Cap»*

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