Problem M. Maximal Difference

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 s
Memory limit:	64 Mib

Vasya chooses two N-digit integers with equal sums of digits. He wants to do it so that difference between them is maximal. Help Vasya to make a choice.

Input

The only line of the input file contains the integer N ($1 \le N \le 10$). .

Output

Output a single integer — the maximal difference between N-digit numbers with equal sums of digits.

Examples

standard input	standard output
2	72

Problem N. Triangle Construction

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 s
Memory limit:	64 Mib

You are given three integers a, b and c. You have to construct a non-degenerate triangle with the specified sides' lengths.

Input

The only line of the input file contains three integers a, b and c.

a, b and c do not exceed 10^5 by their absolute values.

Output

Output 3 lines. Each line should contain Cartesian coordinates of the corresponding triangle's vertex. The distance between the first and the second vertices must be equal to a, between the second and the third — to b, between the first and the third — to c. All the equalities must be satisfied with a error not exceeding 10^{-5}. All the coordinates must not exceed 10^6 by their absolute values. If it is impossible to construct a non-degenerate triangle with the specified lengths of sides, output the single line "`Impossible`".

Examples

standard input	standard output

`3 4 5`	`0.0000000 3.0000000`
	`0.0000000 0.0000000`
	`4.0000000 0.0000000`

`1 2 3`	`Impossible`

Problem O. Beautiful Patterns

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 s
Memory limit:	64 Mib

Company BrokenTiles plans to lay pattern in a yard with black and white tiles. Each of tiles has size 1×1 meter. A yard has the form of the rectangle $N \times M$ meters. However, there were K tiles found, which have been already located in some squares of the yard. You have to determine, how many pattern variants can be laid in the yard, supposing that a pattern should be beautiful.

A pattern is considered to be beautiful, if in every 2×2 square, there are three black tiles and one white tile, or vice versa, one black and three white tiles.

Input

The first line of the input file contains three integers N, M and K. Each of the next K lines contains three integers x, y, c ($1 \le x \le N$, $1 \le y \le M$), indicating that there is a tile located in the square with coordinates (x,y). If it is black, then $c = 0$, and if it is white, then $c = 1$. All the squares are different.

Limits:

$1 \le N, M \le 10$, $0 \le K \le N \times M$.

Output

Output a single integer — the number of different beautiful patterns that can be laid in the yard, modulo $10^9 + 7$. Patterns are considered as different, if there is at least one square containing a white tile in one pattern and a black tile in another one.

Examples

standard input	standard output
5 3 5 2 1 0 5 1 1 1 2 1 4 2 0 3 3 0	4

Problem P. String without repetitions

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 s
Memory limit:	64 Mib

Lets look at the string of characters. We can say that the line $s_1 s_2 \ldots s_n$ is a repetition, if there are two identical substrings that follows one after another. That is, if for some i and k ($i, k > 0$, $i + 2k - 1 \leq n$) following expression $s_i = s_{i+k}$, $s_{i+1} = s_{i+k+1}, \ldots, s_{i+k-1} = s_{i+2k-1}$ is true.

Find lexicographically minimal string of length n without repetitions.

Input

The single line contains an integer n ($1 \leq n \leq 4 \cdot 10^6$)— the length of matched string.

Output

In the single line output the search string. It is allowed to use only small Latin letters. It is guaranteed that for all input, 26 data symbols will be enough to build a string without repetitions (perhaps not optimal).

Examples

standard input	standard output
5	abaca

Problem Q. Beans gathering

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 sec
Memory limit:	64 Mib

There is a line, consisting of $N+1$ cells numbered $0, 1, 2, \ldots, N$. There are some beans in some cells (not 0). On each move you are allowed to perform the next step. If there are not less than i beans in a cell with index i ($i > 0$), the i of them are taken out of the cell and are put one by one into cells with numbers $i-1, i-2, \ldots, 0$. If there are several such cells, you can make your move from any of them. Your task is to assemble all available beans in the cell with the number 0 on the strip.

Input

The first line contains an integer N. The second line contains $N+1$ integers $a_0, a_1, \ldots, a_N$, where a_i is number of beans in the i-th cell.

Limits:

$0 \le N \le 10^5$, $0 \le a_i \le 10^9$.

Output

Output "`Yes`", if sequence, in which all the beans will be in 0 cell, exists. Otherwise,output "`No`".

Examples

standard input	standard output
2 0 1 2	Yes
3 0 1 2 3	No
3 3 3 3 3	Yes

Problem R. Reverse beans gathering

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 s
Memory limit:	64 Mib

There is an endless one-way strip, consisting of cells numbered $0, 1, 2, \ldots$. You have K beans. You have to put them in this strip cells. You should do this in such a way that a sequence of actions exists that will lead to the fact that all K beans will be in the 0-th cell. Let's recall all permitted steps. If a cell with index i ($i > 0$) have at least i beans , the i of them are collected from that cell and placed one by one into cells with numbers $i - 1, i - 2, \ldots, 0$. If there are several such cells, you can make your move from any of them.

Input

The single line contains an integer K ($0 \le K \le 10^5$).

Output

Output N rows where N is the number of cells, which will have nonzero number of beans. Each line should contain two integers i_k and a_k, meaning that the cell with the number i_k is in the initial state for a_k beans. Strings must be ordered by i_k ascending.

If there are multiple cases, select anti-lexicographically minimal. Recall that the set $(x_0, x_1, \ldots, x_i, \ldots)$ anti-lexicographically precedes the set $(y_0, y_1, \ldots, y_i, \ldots)$, if such i exists that following is true: $x_i > y_i$ and $x_j = y_j$ for all $j > i$.

Examples

standard input	standard output
3	1 1 2 2
7	1 1 3 2 4 4

Problem S. Equation

Input file:	*standard input*
Output file:	*standard output*
Time limit:	5 sec
Memory limit:	64 Mib

There is an equation

$$a_N x^N + a_{N-1} x^{N-1} + \ldots + a_1 x + a_0 = yp^2,$$

where a_i, N and p are known integers and x and y are unknown integer variables, $x \geq 0$. It is required to check whether there is a solution of the equation in integers.

Input

The first line contains two integers p and N. The second line contains $N+1$ numbers $a_N, \ldots, a_0$.

Limits:

$0 \leq N \leq 20$, $|a_i| \leq 10^9$, $1 \leq p \leq 2014$.

Output

If the equation has no solution in integers, output -1. Otherwise, output the value x of a pair (x, y), that satisfies the equation. If there are several solutions, select one in which x takes the smallest non-negative value.

Examples

standard input	standard output
3 2 1 2 3	3
2 2 1 1 1	-1

Problem T. Competition

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 sec
Memory limit:	64 Mib

There are two teams on karate competition — A and B. And there are N members in each team with known level of skills. The competition consists of N rounds, one member from each team is involved on each of them. According to the rules, each member can participate in only one round. Each round ends with a victory of one participants, who has the higher skill level. The winner brings his team 1 point, the loser gets 0. At the beginning of competition, coaches of both teams give organizers lists, where they indicate the order their fighters will go to the ring. However, coach of the team B gets to know in what order does fighters of the team A will participate. With this information, he want to create own list so that he can get as many points as he can, and asks you to help him.

Input

The first line contains an integer N. The second line contains N numbers a_i, each defines appropriate team A member's skill level. Values are specified in the order, in which members will go to the ring. The third line contains N numbers b_i — team B members' skill levels. It is guaranteed that skill level of all members are different.

Limits:

$1 \le N \le 2 \cdot 10^5$, $1 \le a_i, b_i \le 2N$.

Output

Output the maximum number of points that team B can get, if coach of this team chooses the most optimal order.

Examples

standard input	standard output
3 3 4 5 1 2 6	1
4 4 5 6 2 1 7 3 8	3

Note

In the first round of the second example coach B sends member with skill level 1 (which will get 0 score points in a fight with member with skill level 4), and the subsequent - karate levels 7, 8 and 3 respectively, who has won their matches against 5, 6, and 2 and has got two points each.

Problem U. The incircle

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 sec
Memory limit:	64 Mib

You are given a convex polygon. We say that some circle is inscribed in a given polygon if all its points are contained within polygon or are on its boundary. We need to find an inscribed circle with the largest radius.

Input

The first line contains an integer N. Each of the following N lines contains two real numbers x_i, y_i, with no more than 6 digits after the decimal point and determining the coordinates of the corresponding vertices of the polygon. Vertices of the polygon are given in the order of traversal. No one of these three points lie on the same line.

Limits:

$3 \le N \le 100$, $-10^6 \le x_i, y_i \le 10^6$.

Output

Print a single number — the maximum radius of the inscribed circle with accuracy of at least 10^{-5}.

Examples

standard input	standard output
3 2.0 0.0 0.0 0.0 1.0 1.0	0.414214
4 -1 0 0 1 2 -1 1 -2	0.707107

Problem V. The dividing line

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 sec
Memory limit:	64 Mib

You are given a set consisting of N points on the plane. The line is considered dividing for this set, if there are two points of the set, lying in different half-planes about this line (but not on this exact line). Your task is to determine for each of the given lines, whether it is dividing or not.

Input

The first line contains an integer N. Each of following N rows contains two integers x_i, y_i, determining the coordinates of the corresponding point in the set. The number M is given in the $(N+2)$-th line. The following M lines contain 4 numbers X_1, Y_1, X_2, Y_2, where (X_1, Y_1) and (X_2, Y_2) — are two different points on the corresponding line.

Limits:

$0 \le N, M \le 10^4$, all coordinates are integers not exceeding 10^9 in absolute value.

Output

Print M rows, each of them defines the result for corresponding line. If the line is dividing, string should contain two numbers - the numbers of points lying in different half-planes relative to the line (points are numbered from one). If the line is not dividing, print number 0.

Examples

standard input	standard output
4 0 2 -1 -2 3 1 2 -1 2 -1 -3 1 1 2 3 5 4	1 3 0

Problem W. Stringangulation

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 sec
Memory limit:	64 Mib

ou are given a string of symbols $s_1 s_2 \ldots s_l$. It is assumed that it is cyclical, i.e. s_l is followed by s_1. The stringangulation of this string is it's partition into three consecutive substrings (no longer cyclic, we denote them a, b and c respectively), each satisfies the triangle inequality, i.e.

$$a + b > c, \; b + c > a, \; c + a > b,$$

where the "+" symbol is usually understood as concatenation for the strings. Strings are compared lexicographically.

Your task is to find the number of its various stringangulations for a given string.

Input

The single input line specifies the string s, consisting of lowercase English letters. String s length is in the range from 3 to 100.

Output

Print a single number – the number of different stringangulations of the line s.

Examples

standard input	standard output
aaa	1
cbccbcacb	2
stringangulation	0

Problem X. Building a square

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 sec
Memory limit:	64 Mib

A line is defined by equation $Ax + By + C = 0$ on a plane. You have to build a square with vertices located on given distances d_1, d_2, d_3, d_4 from this line.

Input

The first row contains coefficients of the line equation A, B, C, and the second row contains distances — d_1, d_2, d_3, d_4.

All values are real, and do not exceed 10^4 in absolute value and have no more than two digits after the comma. At least one number of A and B are nonzero, all the d_i values — nonnegative.

Output

Output 4 rows, each of them contains two numbers — coordinates x and y of the corresponding square vertices. The first printed point should be at a distance d_1 from the line(with accuracy up to 10^{-5}), the second one — at the distance d_2 and so on.

Examples

standard input	standard output
1.0 2.0 3.0 1.0 2.0 3.0 4.0	-0.152786 -0.305573 2.083282 -0.305573 -0.152786 1.930495 2.083282 1.930495
-1 2 -3 6 0 0 0 0 0 0 0 0	Impossible