CODEFORCES β
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15-295 Spring 2017 #2

A. Petr and a calendar

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

Petr wants to make a calendar for current month. For this purpose he draws a table in which columns correspond to weeks (a week is seven consequent days from Monday to Sunday), rows correspond to weekdays, and cells contain dates. For example, a calendar for January 2017 should look like on the picture:

	2	9	16	23	30
	3	10	17	24	31
	4	11	18	25	
	5	12	19	26	
	6	13	20	27	
	7	14	21	28	
1	8	15	22	29	

Petr wants to know how many columns his table should have given the month and the weekday of the first date of that month? Assume that the year is non-leap.

Input

The only line contain two integers m and d ($1 \le m \le 12$, $1 \le d \le 7$) — the number of month (January is the first month, December is the twelfth) and the weekday of the first date of this month (1 is Monday, 7 is Sunday).

Output

Print single integer: the number of columns the table should have.

Examples

input
1 7
output
6

input
1 1
output
5

input
11 6
output
5

Note

The first example corresponds to the January 2017 shown on the picture in the statements.

In the second example 1-st January is Monday, so the whole month fits into 5 columns.

In the third example 1-st November is Saturday and 5 columns is enough.

B. Frodo and pillows

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

n hobbits are planning to spend the night at Frodo's house. Frodo has n beds standing in a row and m pillows ($n \le m$). Each hobbit needs a bed and at least one pillow to sleep, however, everyone wants as many pillows as possible. Of course, it's not always possible to share pillows equally, but any hobbit gets hurt if he has at least two pillows less than some of his neighbors have.

Frodo will sleep on the k-th bed in the row. What is the maximum number of pillows he can have so that every hobbit has at least one pillow, every pillow is given to some hobbit and no one is hurt?

Input

The only line contain three integers n, m and k ($1 \le n \le m \le 10^9$, $1 \le k \le n$) — the number of hobbits, the number of pillows and the number of Frodo's bed.

Output

Print single integer — the maximum number of pillows Frodo can have so that no one is hurt.

Examples

input
4 6 2
output
2

input
3 10 3
output
4

input
3 6 1
output
3

Note

In the first example Frodo can have at most two pillows. In this case, he can give two pillows to the hobbit on the first bed, and one pillow to each of the hobbits on the third and the fourth beds.

In the second example Frodo can take at most four pillows, giving three pillows to each of the others.

In the third example Frodo can take three pillows, giving two pillows to the hobbit in the middle and one pillow to the hobbit on the third bed.

C. k-th divisor

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

You are given two integers n and k. Find k-th smallest divisor of n, or report that it doesn't exist.

Divisor of n is any such natural number, that n can be divided by it without remainder.

Input

The first line contains two integers n and k ($1 \le n \le 10^{15}$, $1 \le k \le 10^{9}$).

Output

If n has less than k divisors, output `-1`.

Otherwise, output the k-th smallest divisor of n.

Examples

input
4 2
output
2

input
5 3
output
-1

input
12 5
output
6

Note

In the first example, number 4 has three divisors: 1, 2 and 4. The second one is 2.

In the second example, number 5 has only two divisors: 1 and 5. The third divisor doesn't exist, so the answer is `-1`.

D. Two strings

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

You are given two strings a and b. You have to remove the minimum possible number of **consecutive** (standing one after another) characters from string b in such a way that it becomes a subsequence of string a. It can happen that you will not need to remove any characters at all, or maybe you will have to remove all of the characters from b and make it empty.

Subsequence of string s is any such string that can be obtained by erasing zero or more characters (**not necessarily consecutive**) from string s.

Input

The first line contains string a, and the second line — string b. Both of these strings are nonempty and consist of lowercase letters of English alphabet. The length of each string is no bigger than 10^5 characters.

Output

On the first line output a subsequence of string a, obtained from b by erasing the minimum number of consecutive characters.

If the answer consists of zero characters, output «−» (a minus sign).

Examples

input
hi bob
output
-

input
abca accepted
output
ac

input
abacaba abcdcba
output
abcba

Note

In the first example strings a and b don't share any symbols, so the longest string that you can get is empty.

In the second example `ac` is a subsequence of a, and at the same time you can obtain it by erasing consecutive symbols `cepted` from string b.

E. Maximum path

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

You are given a rectangular table $3 \times n$. Each cell contains an integer. You can move from one cell to another if they share a side.

Find such path from the upper left cell to the bottom right cell of the table that doesn't visit any of the cells twice, and the sum of numbers written in the cells of this path is maximum possible.

Input

The first line contains an integer n ($1 \le n \le 10^5$) — the number of columns in the table.

Next three lines contain n integers each — the description of the table. The j-th number in the i-th line corresponds to the cell a_{ij} ($-10^9 \le a_{ij} \le 10^9$) of the table.

Output

Output the maximum sum of numbers on a path from the upper left cell to the bottom right cell of the table, that doesn't visit any of the cells twice.

Examples

input
3 1 1 1 1 -1 1 1 1 1

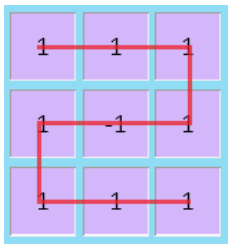
output
7

input
5 10 10 10 -1 -1 -1 10 10 10 10 -1 10 10 10 10

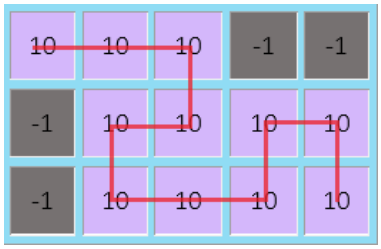
output
110

Note

The path for the first example:



The path for the second example:



F. Tree nesting

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

You are given two trees (connected undirected acyclic graphs) S and T.

Count the number of subtrees (connected subgraphs) of S that are isomorphic to tree T. Since this number can get quite large, output it modulo $10^9 + 7$.

Two subtrees of tree S are considered different, if there exists a vertex in S that belongs to exactly one of them.

Tree G is called isomorphic to tree H if there exists a bijection f from the set of vertices of G to the set of vertices of H that has the following property: if there is an edge between vertices A and B in tree G, then there must be an edge between vertices $f(A)$ and $f(B)$ in tree H. And vice versa — if there is an edge between vertices A and B in tree H, there must be an edge between $f^{-1}(A)$ and $f^{-1}(B)$ in tree G.

Input

The first line contains a single integer $|S|$ ($1 \le |S| \le 1000$) — the number of vertices of tree S.

Next $|S| - 1$ lines contain two integers u_i and v_i ($1 \le u_i, v_i \le |S|$) and describe edges of tree S.

The next line contains a single integer $|T|$ ($1 \le |T| \le 12$) — the number of vertices of tree T.

Next $|T| - 1$ lines contain two integers x_i and y_i ($1 \le x_i, y_i \le |T|$) and describe edges of tree T.

Output

On the first line output a single integer — the answer to the given task modulo $10^9 + 7$.

Examples

input
5 1 2 2 3 3 4 4 5 3 1 2 2 3
output
3

input
3 2 3 3 1 3 1 2 1 3
output
1

input
7 1 2 1 3 1 4 1 5 1 6 1 7 4 4 1 4 2 4 3
output
20

input
5 1 2 2 3 3 4 4 5 4 4 1 4 2 4 3

output
0