

Problem A. Balanced sequence of letters

Input file: **standard input**
Output file: **standard output**
Time limit: 1 second
Memory limit: 256 megabytes

You are given a string S containing lowercase Latin letters $[a - z]$. Determine if string is *balanced*. Here is description of balanced strings:

- empty string is balanced
- if strings s and t are balanced, then string st (concatenation) is also balanced
- if string s is balanced, then string xsx is balanced for any lowercase Latin letter x .

For example, string *abba* is balanced, but string *abbb* is not.

Input

The input line contains single string S ($1 \leq S.length() \leq 10^5$).

Output

Print “YES” if string is balanced, otherwise print “NO”

Examples

standard input	standard output
sbaabsss	YES
sbabasss	NO
baab	YES
abpa	NO

Problem B. Aho-Corazick

Input file: standard input
Output file: standard output
Time limit: 1 second
Memory limit: 256 megabytes

You are given two numbers A and B.

You can do one of the operations with A in each turn.

- Multiply number by 2.
- Decrease the number by 1.

You need to find the minimum number of operations, to make A equal to B.

Also print the every element after doing the operation.

Input

In the first line given two integers A, B ($1 \leq A, B \leq 10^4$)

Output

Print one integer m the minimum number of operations. In the second line print m integers, number after every operation .

Examples

standard input	standard output
5 9	2 10 9
4 8	1 8
4 4	0

Note

Be careful about overflow

Problem C. Ashira and kingdom

Input file: `standard input`
Output file: `standard output`
Time limit: 1 second
Memory limit: 256 megabytes

In the kingdom of Ashura there are many cities connected by a special chakra. As the next great war of all shinobi begins, Ashura wants to share his chakra so that all cities have contact with each other. Any two cities have contact with each other, if from one city you can get to another through a special chakra. What is the smallest number of cities Ashura needs to connect so that he spends as little special chakra as possible?

Input

In the input you are given n and m ($1 \leq n, m \leq 100$). The number of cities and the amount of special chakra between cities. The next m lines contain x, y ($1 \leq x, y \leq 100$) indicating that cities x and y are connected by a special chakra

Output

Print the number of cities that should be connected

Examples

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

Note

gl hf, boyz and girlz

Problem D. Cycled shifts

Input file: `standard input`
Output file: `standard output`
Time limit: 1 second
Memory limit: 256 megabytes

Keqing loves to solve some puzzles. Sometimes she comes up with different conditions and tries to find a solution. This time the problem looks like this: given strings s and t of length n . Determine how many right cyclic shifts are required to get string t from string s .

Input

The first line contains an integer n ($1 \leq n \leq 100000$), the length of strings.

The second line contains a string s .

The third line contains a string t .

Output

If t is not the cyclic shift of string s , print the -1 .

In other case print the answer.

Examples

standard input	standard output
11 abracadabra racadabraab	9
2 ab ba	1
6 nhkbes orhaqw	-1

Note

Cyclic right shift - shift all letters of the string one position forward, except for the last. It will go to the place of the first letter.

ABCD \rightarrow DABC

Problem E. Element of SPADA

Input file: **standard input**
Output file: **standard output**
Time limit: 1 second
Memory limit: 256 megabytes

There are n cities located on a 2d plane, city i has coordinates (x_i, y_i) . To travel between city i and j , you need to be at least $|x_i - x_j| + |y_i - y_j|$ years old. You're currently located at city with index 1, and decided to visit city n , but you're not old enough to do it, so you want to fabricate your documents. To avoid suspicion, you want to find the minimum age required to travel between city 1 and n .

Input

First line contains integer n ($1 \leq n \leq 1000$), a number of cities. The next n lines contain two integers x_i, y_i ($1 \leq x_i, y_i \leq 10^9$), coordinate of city i .

Output

Output single integer - minimum age required to travel between city 1 and city n .

Examples

standard input	standard output
4 1 1 3 3 5 2 5 7	5
1 1 1	0

Problem F. Min absolute sum

Input file: standard input
Output file: standard output
Time limit: 1 second
Memory limit: 256 megabytes

You have array A of length n . In array you must find subsegment (consecutive indexes) with minimum absolute sum.

Input

In first line given integer N ($1 \leq |N| \leq 10^5$) size of array.

In second line you are given n space separated integers $A[i]$. Absolute value of each element in array do not exceed 10^9 .

Output

Print one integer - minimum absolute sum of subsegment.

Example

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

Problem G. Jonathan the Noogler

Input file: **standard input**
Output file: **standard output**
Time limit: 5 seconds
Memory limit: 256 megabytes

Jonathan is the one of the Google newbies. He works on the search system, to be exactly - on hints about past queries when entering another one search query in browser. His task is to write a program that can answer on such types of queries:

1. $+ s$ - add word s to the set
2. $- s$ - remove word s from the set
3. $? s$ - count the number of words in the set that start with s

Jonathan wants to meet with his Google friends, so he hopes for your help.

Input

The first line of the input contains the single integer Q ($2 \leq Q \leq 5 \cdot 10^4$) - the number of queries. Each of the next Q lines contains one of the characters $+$, $-$, $?$ followed by word s ($1 \leq |s| \leq 10^6$). It is guaranteed that total length of words in all queries does not exceed 10^6 . It is also guaranteed that at every moment there are no duplicates in the set.

Output

You have to answer on each query of type 3. All answers must be printed in separate lines.

Examples

standard input	standard output
10 + jonathan + jojonathan + jojo + joji ? joj ? j - jojo ? jo - joj ? joj	3 4 3 2
7 + w + ww + www + wwww ? www - ww ? w	2 3