A. Carpeting the Room

time limit per test: 2 seconds

memory limit per test: 64 megabytes

input: standard input

output: standard output

Soroush's room is a square with side length n. Before this contest he bought k fine Persian carpets to carpet his room for celebrating the 100th contest on his favorite site. Each Persian carpet is a square of side length n_1.

Soroush wants to cover all the area of his room. Carpets can be put over each other but it is not allowed to rotate the carpets. Can Soroush carpet his room completely?

Input

The input consists of three integer numbers n, k and n_1 ($10 \leq n \leq 12$, $1 \leq k \leq 10$, $\lceil \frac{n}{2} \rceil \leq n_1 \leq n$).

Output

Write a single `YES` or `NO`. Write `YES` if and only if Sorush can carpet his room completely.

Sample test(s)

input
10 4 6
output
YES

input
10 2 5
output
NO

B. Friendly Numbers

Kiana thinks two integers are friends if and only if one of them divides the other one. For example, 12 and 4 are friends, also 6 and 6 are friends too, but 120 and 36 are not.

A group of non-zero integers is called friendly, if each pair of its integers form a friend pair.

You are given a group of non-zero integers. See if they're friendly.

Input

The first line contains n ($1 \leq n \leq 1000$), where n — the number of integers in the group.

The next line contains the elements, sorted in the non-decreasing order. The numbers are comma separated, they have at most 7 digits in their decimal notation and do not have any leading zeros.

Output

If the group is friendly write "FRIENDS", else write "NOT FRIENDS".

Sample test(s)

input
4 1,3,6,12
output
FRIENDS

input
3 1,2,9
output
NOT FRIENDS

C. A+B

Bijan is new to programming. He learned recently that programmers do not code every bit of their apps from scratch.

For example they never write a code to sum two integers, because their languages have the ability to do the sum. But can they use it? Can an experienced coder who has attended more than 100 contests, sum two integers?

Bijan is not sure about this. What's your opinion?

Input

You are given two integers a and b, one per line ($1 \le a, b < 10^{500}$). These numbers will not have any leading zeros.

Output

Write sum of the two integers. *Do not put any leading zeros.*

Sample test(s)

input
2 3
output
5

input
1390 2011
output
3401

input
12345 54321
output
66666

D. World of Mouth

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

There are a lot of rumors in the media these days. One day Aida decided to find out how rumors are made.

She asked n of her friends to help her. They all formed a circle and Aida told the person to her right a piece of news which was just a simple string. Then each person told the string to the person on his/her right. But they didn't tell the string exactly as they'd heard it. Each person made *at most* one of these two types of changes:

- Removing one character from the end of the heard string.
- Adding a character to the end of the heard string.

Finally when the rumor passed exactly n moves (a complete cycle), Aida heard something quite different from what she expected from the person on her left. She thinks someone has cheated and made some changes other than those explained above. Now she wants you to write a *Pike* piece of code which gets the initial and final strings and tells Aida whether it's possible to get to the final string from the initial one, by the rules described above.

Input

The first line contains a single integer n ($2 \le n \le 8 \times 10^6$), the number of Aida's friends. The following two lines contain a *non-empty* string each — initial and final strings. The lengths of strings are at most 10^7 and they only contain English alphabet letters.

Output

Write a single `YES` or `NO`. Write `YES` only if it's possible to get to the final string from the initial string.

Sample test(s)

input
100 Codeforces MMIODPC

output
Yes

input
5 MMIOD CF

output
No

Note

The input is case-sensitive, while the output is not.

E. Lamps in a Line

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

There are n lamps in a line. The lamps are numbered 1 to n from left to right. There are also n keys. When key number i is pressed, all lamps number x such that $i|x$ change their state.

For two integer numbers a and b, we say $a|b$ if and only if there exists an integer c such that $a \times c = b$.

Amirali likes to play with the keys. He randomly pressed k keys and wants to know the final state of the lamps. Help him by writing a *Pike* piece of code to solve this task.

Input

The first line of input contains a single integer n, the number of lamps ($1 \le n \le 10^5$).

The following line contains n words. The i-th word describes the initial state of lamp number i (see samples for details).

The following line contains a single integer k ($1 \le k \le 10^4$), the number of times a key is pressed. Then in the next line come k integers in range $[1, n]$ which are the numbers of the pressed keys.

Output

Write n words to output. Describe the final state of the lamps. See samples for more details.

Sample test(s)

input
```
2
off off
2
1 2
```

output
```
on off
```

input
```
3
off off on
6
1 1 1 1 2 2
```

output
```
off off on
```

F. Polynom

You are given a polynom in form $p(x) = (x + a_1) \cdot (x + a_2) \cdot \ldots (x + a_n)$. Write Pike program to print it in a standard form $p(x) = x^n + b_1 x^{n-1} + \ldots + b_{n-1} x + b_n$. You should write each addend in form «C*X^K» (for example, 5*X^8).

Please, write the polynom in the shortest way, so you should skip unnecessary terms: some terms «C*X^K» should be reduced or even omitted. Look for the samples for clarification.

Input

The first line of the input contains n ($1 \le n \le 9$). The following n lines contain integer a_i ($-10 \le a_i \le 10$).

Output

Print the given polynom in a standard way. Note, that the answer in this problem response uniquely determined.

Sample test(s)

input
2 -1 1

output
X^2-1

input
2 1 1

output
X^2+2*X+1

G. Name the album

The famous singer, Aryo, is going to publish a new album of his great work!

Unfortunately these days, there are many albums, Aryo wants to choose a new name for his album, a name that has not been used or at least has not been used recently.

He has a list of all used album names together with the year the albums were published. He also has a list of suitable names for his album.

If he finds a suitable name which has not been used before, he'll use it. Otherwise he will use the name which was used as long ago as possible. If two such names are found (that haven't been used or were used at the same year), he uses the name that is alphabetically latest.

Help him name his album.

Input

The first line contains a single integer n ($0 \le n \le 10^5$), the number of used names.

The following n lines each contain a string (the album name) and an integer (the year album was published). Album names are made of lowercase Latin letters and contain at most 14 letters. The year is in range $[1900, 2011]$.

The following line contains a single integer m ($1 \le m \le 10^4$), the number of suitable album names.

The following m lines each contain a string — a suitable name. It contains at most 14 lowercase Latin letters.

All album names and suitable names are *non-empty*.

Output

Write a single string. The name of the new album.

Sample test(s)

input
3 eyesonme 2008 anewdayhascome 2002 oneheart 2003 2 oneheart bienbien

output
bienbien

input
2 nasimevasl 2003 basetareha 2006 2 nasimevasl basetareha

output
nasimevasl

H. Battleship

time limit per test: 2 seconds
memory limit per test: 64 megabytes
input: standard input
output: standard output

Do you know the game Battleship? If no, look into Wikipedia article http://en.wikipedia.org/wiki/Battleship_(game). You are given the positions of ships on a 10×10 board for playing Battleship. According to the rules, the board should contain the following ships:

- one of size 4 (4×1 or 1×4 rectangle),
- two of size 3 (3×1 or 1×3 rectangles),
- three of size 2 (2×1 or 1×2 rectangles),
- four of size 1 (1×1 rectangles).

The ships should not 'bend', touch each other or overlap in any way. Each ship can be oriented horizontaly or verticaly. Your task is to check whether the given set of boards meets the given conditions.

Input

The first line contains number n ($1 \le n \le 10$) — the number of boards. Each board is described by 10 lines containing 10 characters each. The symbol "0" stands for an empty square and the symbol "*" stands for a square occupied by a ship. The descriptions of boards are separated with empty lines.

Output

Print n lines YES or NO. Print the first word if the board meets the given conditions; otherwise print the second word.

Sample test(s)

input

```
2
****000000
0000000000
***00***00
0000000000
00000000**
000**00000
00000000**
000*000000
00000*00*0
0*00000000

****000000
0000000000
***00***00
0000000000
00000000**
000**00000
00000000**
0000*00000
00000*00*0
0*00000000
```

output

```
YES
NO
```

I. Rotation

Ehsan loves geometry! Especially he likes to rotate points!

Given a point in the plane, Ehsan likes to rotate it by k degrees (counter-clockwise), around the *origin*. What is the result of this rotation?

Input

A single integer k ($0 \leq k < 360$) is given in the first line. Two integer numbers x and y are given in the second line ($-1390 \leq x, y \leq 1390$).

Output

Write two numbers. The result of the rotation. Your answer must have a relative error less than 10^{-1}.

Sample test(s)

input
90
1 1
output
-1.00000000 1.00000000

input
180
1 1390
output
-1.00000000 -1390.00000000

J. Interval Coloring

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

Aryo has got a lot of intervals for his 2418th birthday. He is really excited and decided to color all these intervals with some colors. He has a simple rule for himself. He calls a coloring nice if there exists *no* three intervals a, b and c such that the following conditions are satisfied simultaneously:

- a, b and c are colored with the same color,
- $a \cap b \neq \varnothing$,
- $b \cap c \neq \varnothing$,
- $a \cap c = \varnothing$.

Moreover he found out that for every intervals i and j, there is at least one point in i which isn't in j.

Given some set of intervals. You have to find the minimum number k, such that Aryo can find a nice coloring with k colors.

Input

The first line contains a single integer n ($1 \leq n \leq 10^3$), number of intervals.

The following n lines contain a interval description each. Each interval is described by two numbers s_i, e_i which are the start and end points of it ($-10^5 < s_i, e_i < 10^5$, $s_i \leq e_i$). See samples for clarity. A square bracket stands for including of the corresponding endpoint, while a round bracket stands for excluding.

Output

Write a single integer k — the minimum number of colors needed for a nice coloring.

Sample test(s)

input
```
2
[1,2)
(3,4]
```

output
```
1
```

input
```
3
[1,3]
[2,6]
(5,7)
```

output
```
2
```