A. Dima and Continuous Line

time limit per test: 2 seconds

memory limit per test: 256 megabytes

input: standard input

output: standard output

Dima and Seryozha live in an ordinary dormitory room for two. One day Dima had a date with his girl and he asked Seryozha to leave the room. As a compensation, Seryozha made Dima do his homework.

The teacher gave Seryozha the coordinates of n distinct points on the abscissa axis and asked to consecutively connect them by semi-circus in a certain order: first connect the first point with the second one, then connect the second point with the third one, then the third one with the fourth one and so on to the n-th point. Two points with coordinates $(x_1, 0)$ and $(x_2, 0)$ should be connected by a semi-circle that passes above the abscissa axis with the diameter that coincides with the segment between points. Seryozha needs to find out if the line on the picture intersects itself. For clarifications, see the picture Seryozha showed to Dima (the left picture has self-intersections, the right picture doesn't have any).
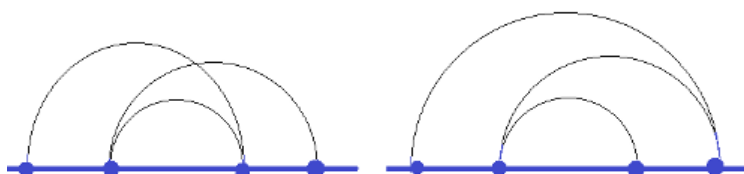
Seryozha is not a small boy, so the coordinates of the points can be rather large. Help Dima cope with the problem.

Input

The first line contains a single integer n ($1 \le n \le 10^3$). The second line contains n distinct integers $x_1, x_2, ..., x_n$ ($-10^6 \le x_i \le 10^6$) — the i-th point has coordinates $(x_i, 0)$. The points are not necessarily sorted by their x coordinate.

Output

In the single line print "`yes`" (without the quotes), if the line has self-intersections. Otherwise, print "`no`" (without the quotes).

Sample test(s)

input
4 0 10 5 15

output
yes

input
4 0 15 5 10

output
no

Note

The first test from the statement is on the picture to the left, the second test is on the picture to the right.

B. Dima and Text Messages

Seryozha has a very changeable character. This time he refused to leave the room to Dima and his girlfriend (her hame is Inna, by the way). However, the two lovebirds can always find a way to communicate. Today they are writing text messages to each other.

Dima and Inna are using a secret code in their text messages. When Dima wants to send Inna some sentence, he writes out all words, inserting a heart before each word and after the last word. A heart is a sequence of two characters: the "less" characters ($<$) and the digit three (3). After applying the code, a test message looks like that: $<3word_1<3word_2<3 ... word_n<3$.

Encoding doesn't end here. Then Dima inserts a random number of small English characters, digits, signs "more" and "less" into any places of the message.

Inna knows Dima perfectly well, so she knows what phrase Dima is going to send her beforehand. Inna has just got a text message. Help her find out if Dima encoded the message correctly. In other words, find out if a text message could have been received by encoding in the manner that is described above.

Input

The first line contains integer n ($1 \leq n \leq 10^5$) — the number of words in Dima's message. Next n lines contain non-empty words, one word per line. The words only consist of small English letters. The total length of all words doesn't exceed 10^5.

The last line contains non-empty text message that Inna has got. The number of characters in the text message doesn't exceed 10^5. A text message can contain only small English letters, digits and signs more and less.

Output

In a single line, print "`yes`" (without the quotes), if Dima decoded the text message correctly, and "`no`" (without the quotes) otherwise.

Sample test(s)

input
3 i love you `<3i<3love<23you<3`

output
yes

input
7 i am not main in the family `<3i<>3am<3the<3<main<3in<3the<3><3family<3`

output
no

Note

Please note that Dima got a good old kick in the pants for the second sample from the statement.

C. Dima and Containers

Dima has a birthday soon! It's a big day! Saryozha's present to Dima is that Seryozha won't be in the room and won't disturb Dima and Inna as they celebrate the birthday. Inna's present to Dima is a stack, a queue and a deck.

Inna wants her present to show Dima how great a programmer he is. For that, she is going to give Dima commands one by one. There are two types of commands:

1. Add a given number into one of containers. For the queue and the stack, you can add elements only to the end. For the deck, you can add elements to the beginning and to the end.
2. Extract a number from each of at most three distinct containers. Tell all extracted numbers to Inna and then empty all containers. In the queue container you can extract numbers only from the beginning. In the stack container you can extract numbers only from the end. In the deck number you can extract numbers from the beginning and from the end. You cannot extract numbers from empty containers.

Every time Dima makes a command of the second type, Inna kisses Dima some (possibly zero) number of times. Dima knows Inna perfectly well, he is sure that this number equals the sum of numbers he extracts from containers during this operation.

As we've said before, Dima knows Inna perfectly well and he knows which commands Inna will give to Dima and the order of the commands. Help Dima find the strategy that lets him give as more kisses as possible for his birthday!

Input

The first line contains integer n $(1 \le n \le 10^5)$ — the number of Inna's commands. Then n lines follow, describing Inna's commands. Each line consists an integer:

1. Integer a $(1 \le a \le 10^5)$ means that Inna gives Dima a command to add number a into one of containers.
2. Integer 0 shows that Inna asks Dima to make at most three extractions from different containers.

Output

Each command of the input must correspond to one line of the output — Dima's action.

For the command of the first type (adding) print one word that corresponds to Dima's choice:

- pushStack — add to the end of the stack;
- pushQueue — add to the end of the queue;
- pushFront — add to the beginning of the deck;
- pushBack — add to the end of the deck.

For a command of the second type first print an integer k $(0 \le k \le 3)$, that shows the number of extract operations, then print k words separated by space. The words can be:

- popStack — extract from the end of the stack;
- popQueue — extract from the beginning of the line;
- popFront — extract from the beginning from the deck;
- popBack — extract from the end of the deck.

The printed operations mustn't extract numbers from empty containers. Also, they must extract numbers from distinct containers.

The printed sequence of actions must lead to the maximum number of kisses. If there are multiple sequences of actions leading to the maximum number of kisses, you are allowed to print any of them.

Sample test(s)

```
input
```

```
10
0
1
0
1
2
0
1
2
3
0
```

```
output
```

```
0
pushStack
1 popStack
pushStack
pushQueue
2 popStack popQueue
pushStack
pushQueue
```

```
pushFront
3 popStack popQueue popFront
```

input

```
4
1
2
3
0
```

output

```
pushStack
pushQueue
pushFront
3 popStack popQueue popFront
```

D. Dima and Hares

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

Dima liked the present he got from Inna very much. He liked the present he got from Seryozha even more.

Dima felt so grateful to Inna about the present that he decided to buy her n hares. Inna was very happy. She lined up the hares in a row, numbered them from 1 to n from left to right and started feeding them with carrots. Inna was determined to feed each hare exactly once. But in what order should she feed them?

Inna noticed that each hare radiates joy when she feeds it. And the joy of the specific hare depends on whether Inna fed its adjacent hares before feeding it. Inna knows how much joy a hare radiates if it eats when either both of his adjacent hares are hungry, or one of the adjacent hares is full (that is, has been fed), or both of the adjacent hares are full. Please note that hares number 1 and n don't have a left and a right-adjacent hare correspondingly, so they can never have two full adjacent hares.

Help Inna maximize the total joy the hares radiate. :)

Input

The first line of the input contains integer n $(1 \le n \le 3000)$ — the number of hares. Then three lines follow, each line has n integers. The first line contains integers $a_1\ a_2\ ...\ a_n$. The second line contains $b_1, b_2, ..., b_n$. The third line contains $c_1, c_2, ..., c_n$. The following limits are fulfilled: $0 \le a_i, b_i, c_i \le 10^5$.

Number a_i in the first line shows the joy that hare number i gets if his adjacent hares are both hungry. Number b_i in the second line shows the joy that hare number i radiates if he has exactly one full adjacent hare. Number c_i in the third line shows the joy that hare number i radiates if both his adjacent hares are full.

Output

In a single line, print the maximum possible total joy of the hares Inna can get by feeding them.

Sample test(s)

input

```
4
1 2 3 4
4 3 2 1
0 1 1 0
```

output

```
13
```

input

```
7
8 5 7 6 1 8 9
2 7 9 5 4 3 1
2 3 3 4 1 1 3
```

output

```
44
```

input

```
3
1 1 1
1 2 1
1 1 1
```

output

```
4
```

E. Dima and Kicks

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

Dima is a good person. In fact, he's great. But all good things come to an end...

Seryozha is going to kick Dima just few times.. For this reason he divides the room into unit squares. Now the room is a rectangle $n \times m$ consisting of unit squares.

For the beginning, Seryozha put Dima in a center of some square. Then he started to kick Dima (it is known, that he kicks Dima at least once). Each time when Dima is kicked he flyes up and moves into one of four directions (up, left, right, down). On each move Dima passes k $(k > 1)$ unit of the length in the corresponding direction. Seryozha is really kind, so he kicks Dima in such way that Dima never meets the walls (in other words, Dima never leave the room's space). Seryozha is also dynamic character so Dima never flies above the same segment, connecting a pair of adjacent squares, twice.

Seryozha kicks Dima for a long time, but Dima is not vindictive — Dima writes. Dima marked all squares in which he was staying or above which he was flying. Thanks to kicks, Dima does not remember the k value, so he asks you to find all possible values which matches to the Dima's records.

Input

The first line contains n and m $(1 \le n, m \le 10^3)$ — size of the room.

Next n lines goes, each contains m numbers a_{ij} — Dima's notes: $a_{ij} = 1$, if Dima was staying in the square (i, j) or was flying above it. Otherwise $a_{ij} = 0$.

At least one a_{ij} equals 1.

Output

In a single line in accending order print all k $(k > 1)$, which matches the Dima's notes. If there are no such k and Dima invented this story with kicks, print -1.

Sample test(s)

input
```
5 5
1 1 1 1 1
1 0 0 0 1
1 0 0 0 1
1 0 0 0 1
1 1 1 1 1
```
output
```
2 4
```

input
```
7 7
0 0 1 1 1 0 0
0 0 1 0 1 0 0
1 1 1 1 1 1 1
1 0 1 0 1 0 1
1 1 1 1 1 1 1
0 0 1 0 1 0 0
0 0 1 1 1 0 0
```
output
```
2
```

input
```
3 3
1 1 1
1 1 1
1 1 1
```
output
```
-1
```

input
```
4 4
1 1 1 1
0 0 0 0
0 0 0 0
0 0 0 0
```
output
```
3
```

input
5 5 0 0 1 0 0 0 0 1 0 0 1 1 1 1 1 0 0 1 0 0 0 0 1 0 0
output
-1