Codeforces Round #390 (Div. 2)

A. Lesha and array splitting

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

One spring day on his way to university Lesha found an array A. Lesha likes to split arrays into several parts. This time Lesha decided to split the array A into several, possibly one, new arrays so that the sum of elements in each of the new arrays is not zero. One more condition is that if we place the new arrays one after another they will form the old array A.

Lesha is tired now so he asked you to split the array. Help Lesha!

Input

The first line contains single integer n ($1 \le n \le 100$) — the number of elements in the array A.

The next line contains n integers $a_1, a_2, ..., a_n$ ($-10^3 \le a_i \le 10^3$) — the elements of the array A.

Output

If it is not possible to split the array A and satisfy all the constraints, print single line containing "NO" (without quotes).

Otherwise in the first line print "YES" (without quotes). In the next line print single integer k — the number of new arrays. In each of the next k lines print two integers l_i and r_i which denote the subarray $A[l_i ... r_i]$ of the initial array A being the i-th new array. Integers l_i, r_i should satisfy the following conditions:

- $l_1 = 1$
- $r_k = n$
- $r_i + 1 = l_{i+1}$ for each $1 \le i < k$.

If there are multiple answers, print any of them.

Examples

input
3 1 2 -3
output
YES 2 1 2 3 3

input
8 9 -12 3 4 -4 -10 7 3
output
YES 2 1 2 3 8

input
1 0
output
NO

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

```
3 3
4 4
```

B. Ilya and tic-tac-toe game

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

Ilya is an experienced player in tic-tac-toe on the 4×4 field. He always starts and plays with Xs. He played a lot of games today with his friend Arseny. The friends became tired and didn't finish the last game. It was Ilya's turn in the game when they left it. Determine whether Ilya could have won the game by making single turn or not.

The rules of tic-tac-toe on the 4×4 field are as follows. Before the first turn all the field cells are empty. The two players take turns placing their signs into empty cells (the first player places Xs, the second player places Os). The player who places Xs goes first, the another one goes second. The winner is the player who first gets **three of his signs in a row next to each other** (horizontal, vertical or diagonal).

Input

The tic-tac-toe position is given in four lines.

Each of these lines contains four characters. Each character is '`.`' (empty cell), '`x`' (lowercase English letter *x*), or '`o`' (lowercase English letter *o*). It is guaranteed that the position is reachable playing tic-tac-toe, and it is Ilya's turn now (in particular, it means that the game is not finished). It is possible that all the cells are empty, it means that the friends left without making single turn.

Output

Print single line: "`YES`" in case Ilya could have won by making single turn, and "`NO`" otherwise.

Examples

input
xx.. .oo. x... oox.
output
YES

input
x.ox ox.. x.o. oo.x
output
NO

input
x..x ..oo o... x.xo
output
YES

input
o.x. o... .x.. ooxx
output
NO

Note

In the first example Ilya had two winning moves: to the empty cell in the left column and to the leftmost empty cell in the first row.

In the second example it wasn't possible to win by making single turn.

In the third example Ilya could have won by placing X in the last row between two existing Xs.

In the fourth example it wasn't possible to win by making single turn.

C. Vladik and chat

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

Recently Vladik discovered a new entertainment — coding bots for social networks. He would like to use machine learning in his bots so now he want to prepare some learning data for them.

At first, he need to download t chats. Vladik coded a script which should have downloaded the chats, however, something went wrong. In particular, some of the messages have no information of their sender. It is known that if a person sends several messages in a row, they all are merged into a single message. It means that **there could not be two or more messages in a row with the same sender**. Moreover, **a sender never mention himself in his messages**.

Vladik wants to recover senders of all the messages so that each two neighboring messages will have different senders and no sender will mention himself in his messages.

He has no idea of how to do this, and asks you for help. Help Vladik to recover senders in each of the chats!

Input

The first line contains single integer t ($1 \le t \le 10$) — the number of chats. The t chats follow. Each chat is given in the following format.

The first line of each chat description contains single integer n ($1 \le n \le 100$) — the number of users in the chat.

The next line contains n space-separated distinct usernames. Each username consists of lowercase and uppercase English letters and digits. The usernames can't start with a digit. Two usernames are different even if they differ only with letters' case. The length of username is positive and doesn't exceed 10 characters.

The next line contains single integer m ($1 \le m \le 100$) — the number of messages in the chat. The next m line contain the messages in the following formats, one per line:

- `<username>:<text>` — the format of a message with known sender. The username should appear in the list of usernames of the chat.
- `<?>:<text>` — the format of a message with unknown sender.

The text of a message can consist of lowercase and uppercase English letter, digits, characters `'.'` (dot), `','` (comma), `'!'` (exclamation mark), `'?'` (question mark) and `' '` (space). The text doesn't contain trailing spaces. The length of the text is positive and doesn't exceed 100 characters.

We say that a text mention a user if his username appears in the text as a word. In other words, the username appears in a such a position that the two characters before and after its appearance either do not exist or are not English letters or digits. For example, the text "`Vasya, masha13 and Kate!`" can mention users "`Vasya`", "`masha13`", "`and`" and "`Kate`", but not "`masha`".

It is guaranteed that in each chat **no known sender mention himself in his messages** and there are no two neighboring messages with the same known sender.

Output

Print the information about the t chats in the following format:

If it is not possible to recover senders, print single line "`Impossible`" for this chat. Otherwise print m messages in the following format:

`<username>:<text>`

If there are multiple answers, print any of them.

Examples

input
1 2 Vladik netman 2 ?: Hello, Vladik! ?: Hi
output
netman: Hello, Vladik! Vladik: Hi

input
1 2 netman vladik 3 netman:how are you? ?:wrong message vladik:im fine
output

```
Impossible
```

input

```
2
3
netman vladik Fedosik
2
?: users are netman, vladik, Fedosik
vladik: something wrong with this chat
4
netman tigerrrrr banany2001 klinchuh
4
?: tigerrrrr, banany2001, klinchuh, my favourite team ever, are you ready?
klinchuh: yes, coach!
?: yes, netman
banany2001: yes of course.
```

output

```
Impossible
netman: tigerrrrr, banany2001, klinchuh, my favourite team ever, are you ready?
klinchuh: yes, coach!
tigerrrrr: yes, netman
banany2001: yes of course.
```

D. Fedor and coupons

time limit per test: 4 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

All our characters have hobbies. The same is true for Fedor. He enjoys shopping in the neighboring supermarket.

The goods in the supermarket have unique integer ids. Also, for every integer there is a product with id equal to this integer. Fedor has n discount coupons, the i-th of them can be used with products with ids ranging from l_i to r_i, inclusive. Today Fedor wants to take exactly k coupons with him.

Fedor wants to choose the k coupons in such a way that the number of such products x that all coupons can be used with this product x is as large as possible (for better understanding, see examples). Fedor wants to save his time as well, so he asks you to choose coupons for him. Help Fedor!

Input

The first line contains two integers n and k ($1 \le k \le n \le 3 \cdot 10^5$) — the number of coupons Fedor has, and the number of coupons he wants to choose.

Each of the next n lines contains two integers l_i and r_i ($-10^9 \le l_i \le r_i \le 10^9$) — the description of the i-th coupon. The coupons can be equal.

Output

In the first line print single integer — the maximum number of products with which all the chosen coupons can be used. The products with which at least one coupon cannot be used shouldn't be counted.

In the second line print k distinct integers $p_1, p_2, \ldots, p_k$ ($1 \le p_i \le n$) — the ids of the coupons which Fedor should choose.

If there are multiple answers, print any of them.

Examples

input
4 2 1 100 40 70 120 130 125 180
output
31 1 2

input
3 2 1 12 15 20 25 30
output
0 1 2

input
5 2 1 10 5 15 14 50 30 70 99 100
output
21 3 4

Note

In the first example if we take the first two coupons then all the products with ids in range $[40, 70]$ can be bought with both coupons. There are 31 products in total.

In the second example, no product can be bought with two coupons, that is why the answer is 0. Fedor can choose any two coupons in this example.

E. Dasha and cyclic table

time limit per test: 6 seconds
memory limit per test: 512 megabytes
input: standard input
output: standard output

Dasha is fond of challenging puzzles: Rubik's Cube $3 \times 3 \times 3$, $4 \times 4 \times 4$, $5 \times 5 \times 5$ and so on. This time she has a cyclic table of size $n \times m$, and each cell of the table contains a lowercase English letter. Each cell has coordinates (i, j) ($0 \le i < n$, $0 \le j < m$). The table is cyclic means that to the right of cell (i, j) there is the cell , and to the down there is the cell .

Dasha has a pattern as well. A pattern is a non-cyclic table of size $r \times c$. Each cell is either a lowercase English letter or a question mark. Each cell has coordinates (i, j) ($0 \le i < r$, $0 \le j < c$).

The goal of the puzzle is to find all the appearance positions of the pattern in the cyclic table.

We say that the cell (i, j) of cyclic table is an appearance position, if for every pair (x, y) such that $0 \le x < r$ and $0 \le y < c$ one of the following conditions holds:

- There is a question mark in the cell (x, y) of the pattern, or
- The cell of the cyclic table equals to the cell (x, y) of the pattern.

Dasha solved this puzzle in no time, as well as all the others she ever tried. Can you solve it?.

Input

The first line contains two integers n and m ($1 \le n, m \le 400$) — the cyclic table sizes.

Each of the next n lines contains a string of m lowercase English characters — the description of the cyclic table.

The next line contains two integers r and c ($1 \le r, c \le 400$) — the sizes of the pattern.

Each of the next r lines contains a string of c lowercase English letter and/or characters '?' — the description of the pattern.

Output

Print n lines. Each of the n lines should contain m characters. Each of the characters should equal '0' or '1'.

The j-th character of the i-th (0-indexed) line should be equal to '1', in case the cell (i, j) is an appearance position, otherwise it should be equal to '0'.

Examples

input
5 7 qcezchs hhedywq wikywqy qckrqzt bqexcxz 3 2 ?? yw ?q

output
0000100 0001001 0000000 0000000 0000000

input
10 10 fwtoayylhw yyaryyjawr ywrdzwhscy hnsyyxiphn bnjwzyyjvo kkjgseenwn gvmiflpcsy lxvkwrobwu wyybbcocyy yysijsvqry 2 2 ?? yy

output
1000100000 0000000001 0001000000 0000010000

```
0000000000
0000000000
0000000000
0100000010
1000000001
0000010000
```

input

```
8 6
ibrgxl
xqdcsg
okbcgi
tvpetc
xgxxig
igghzo
lmlaza
gpswzv
1 4
gx??
```

output

```
000100
000001
000000
000000
010001
000000
000000
000000
```