Yandex.Algorithm Open 2011
Qualification 1

A. Plug-in

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

Polycarp thinks about the meaning of life very often. He does this constantly, even when typing in the editor. Every time he starts brooding he can no longer fully concentrate and repeatedly presses the keys that need to be pressed only once. For example, instead of the phrase "how are you" he can type "hhoow aaaare yyoouu".

Polycarp decided to automate the process of correcting such errors. He decided to write a plug-in to the text editor that will remove pairs of identical consecutive letters (if there are any in the text). Of course, this is not exactly what Polycarp needs, but he's got to start from something!

Help Polycarp and write the main plug-in module. Your program should remove from a string all pairs of identical letters, which are consecutive. If after the removal there appear new pairs, the program should remove them as well. Technically, its work should be equivalent to the following: while the string contains a pair of consecutive identical letters, the pair should be deleted. Note that deleting of the consecutive identical letters can be done in any order, as any order leads to the same result.

Input

The input data consists of a single line to be processed. The length of the line is from 1 to $2 \cdot 10^5$ characters inclusive. The string contains only lowercase Latin letters.

Output

Print the given string after it is processed. It is guaranteed that the result will contain at least one character.

Examples

input
hhoowaaaareyyoouu
output
wre

input
reallazy
output
rezy

input
abacabaabacabaa
output
a

B. Sequence Formatting

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

Polycarp is very careful. He even types numeric sequences carefully, unlike his classmates. If he sees a sequence without a space after the comma, with two spaces in a row, or when something else does not look neat, he rushes to correct it. For example, number sequence written like "`1,2 ,3,...,  10`" will be corrected to "`1, 2, 3, ..., 10`".

In this task you are given a string s, which is composed by a concatination of terms, each of which may be:

- a positive integer of an arbitrary length (leading zeroes are not allowed),
- a "comma" symbol ("`,`"),
- a "space" symbol ("` `"),
- "three dots" ("`...`", that is, exactly three points written one after another, also known as suspension points).

Polycarp wants to add and remove spaces in the string s to ensure the following:

- each comma is followed by exactly one space (if the comma is the last character in the string, this rule does not apply to it),
- each "three dots" term is preceded by exactly one space (if the dots are at the beginning of the string, this rule does not apply to the term),
- if two consecutive numbers were separated by spaces only (one or more), then exactly one of them should be left,
- there should not be other spaces.

Automate Polycarp's work and write a program that will process the given string s.

Input

The input data contains a single string s. Its length is from 1 to 255 characters. The string s does not begin and end with a space. Its content matches the description given above.

Output

Print the string s after it is processed. Your program's output should be *exactly* the same as the expected answer. It is permissible to end output line with a line-break character, and without it.

Examples

input
`1,2 ,3,...,  10`
output
`1, 2, 3, ..., 10`

input
`1,,,4...5......6`
output
`1, , , 4 ...5 ... ...6`

input
`...,1,2,3,...`
output
`..., 1, 2, 3, ...`

C. Average Score

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

After the educational reform Polycarp studies only two subjects at school, Safety Studies and PE (Physical Education). During the long months of the fourth term, he received n marks in them. When teachers wrote a mark in the journal, they didn't write in what subject the mark was for, they just wrote the mark.

Now it's time to show the journal to his strict parents. Polycarp knows that recently at the Parent Meeting the parents were told that he received a Safety Studies marks and b PE marks ($a + b = n$). Now Polycarp wants to write a subject's name in front of each mark so that:

- there are exactly a Safety Studies marks,
- there are exactly b PE marks,
- the total average score in both subjects is maximum.

An average subject grade is the sum of all marks in it, divided by the number of them. Of course, the division is performed in real numbers without rounding up or down. Polycarp aims to maximize the $x_1 + x_2$, where x_1 is the average score in the first subject (Safety Studies), and x_2 is the average score in the second one (Physical Education).

Input

The first line contains an integer n ($2 \le n \le 10^5$), n is the number of marks in Polycarp's Journal. The second line contains two positive integers a, b ($1 \le a, b \le n$ - 1, $a + b = n$). The third line contains a sequence of integers t_1, t_2, ..., t_n ($1 \le t_i \le 5$), they are Polycarp's marks.

Output

Print the sequence of integers $f_1, f_2, ..., f_n$, where f_i ($1 \le f_i \le 2$) is the number of a subject to which the i-th mark should be attributed. If there are several possible solutions, then print such that the sequence $f_1, f_2, ..., f_n$ is the smallest lexicographically.

The sequence $p_1, p_2, ..., p_n$ is lexicographically less than $q_1, q_2, ..., q_n$ if there exists such j ($1 \le j \le n$) that $p_i = q_i$ for all $1 \le i < j$, and $p_j < q_j$.

Examples

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

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

input
6 1 5 4 4 4 5 4 4
output
2 2 2 1 2 2

Note

In the first sample the average score in the first subject is equal to 4, and in the second one — to 4.5. The total average score is 8.5.

D. Polycarp's Picture Gallery

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

Polycarp loves not only to take pictures, but also to show his photos to friends. On his personal website he has recently installed a widget that can display n photos with the scroll option. At each moment of time the widget displays exactly one photograph with the option showing the previous/next one. From the first photo, you can switch to the second one or to the n-th one, from the second photo you can switch to the third one or to the first one, etc. Thus, navigation is performed in a cycle.

Polycarp's collection consists of m photo albums, the i-th album contains a_i photos. Polycarp wants to choose n photos and put them on a new widget. To make watching the photos interesting to the visitors, he is going to post pictures so that no two photos from one album were neighboring (each photo will have exactly two neighbors, the first photo's neighbors are the second and the n-th one).

Help Polycarp compile a photo gallery. Select n photos from his collection and put them in such order that no two photos from one album went one after the other.

Input

The first line contains two integers n and m ($3 \le n \le 1000$, $1 \le m \le 40$), where n is the number of photos on the widget, and m is the number of albums. The second line contains m integers $a_1, a_2, \ldots, a_m$ ($1 \le a_i \le 1000$), where a_i is the number of photos in the i-th album.

Output

Print the single number `-1` if there is no solution. Otherwise, print n numbers $t_1, t_2, \ldots, t_n$, where t_i represents the number of the album of the i-th picture in the widget. The albums are numbered from 1 in the order of their appearance in the input. If there are several solutions, print any of them.

Examples

input
4 3 1 3 5
output
3 1 3 2

input
10 2 5 5
output
2 1 2 1 2 1 2 1 2 1

input
10 3 1 10 3
output
-1

E. Pairs

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

There are n students in Polycarp's class (including himself). A few days ago all students wrote an essay "My best friend". Each student's essay was dedicated to one of the students of class, to his/her best friend. Note that student b's best friend is not necessarily student a, if a's best friend is b.

And now the teacher leads the whole class to the museum of the history of sports programming. Exciting stories of legendary heroes await the students: tourist, Petr, tomek, SnapDragon — that's who they will hear about!

The teacher decided to divide students into pairs so that each pair consisted of a student and his best friend. She may not be able to split all the students into pairs, it's not a problem — she wants to pick out the maximum number of such pairs. If there is more than one variant of doing so, she wants to pick out the pairs so that there were as much boy-girl pairs as possible. Of course, each student must not be included in more than one pair.

Input

The first line contains an integer n ($2 \le n \le 10^5$), n is the number of students per class. Next, n lines contain information about the students, one per line. Each line contains two integers f_i, s_i ($1 \le f_i \le n, f_i \ne i$, $1 \le s_i \le 2$), where f_i is the number of i-th student's best friend and s_i denotes the i-th pupil's sex ($s_i = 1$ for a boy and $s_i = 2$ for a girl).

Output

Print on the first line two numbers t, e, where t is the maximum number of formed pairs, and e is the maximum number of boy-girl type pairs among them. Then print t lines, each line must contain a pair a_i, b_i ($1 \le a_i$, $b_i \le n$), they are numbers of pupils in the i-th pair. Print the pairs in any order. Print the numbers in pairs in any order. If there are several solutions, output any of them.

Examples

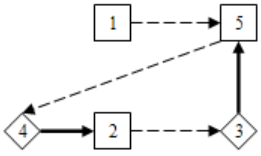
input
5 5 2 3 2 5 1 2 1 4 2
output
2 2 5 3 4 2

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

input
8 2 2 3 2 5 1 3 1 6 1 5 1 8 2 7 1
output
4 1 5 6 3 4 2 1 7 8

Note

The picture corresponds to the first sample. On the picture rhomb stand for boys, squares stand for girls, arrows lead from a pupil to his/her best friend. Bold non-dashed arrows stand for pairs in the answer.



Codeforces (c) Copyright 2010-2017 Mike Mirzayanov
The only programming contests Web 2.0 platform