Codeforces Round #151 (Div. 2)

A. Buggy Sorting

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

Little boy Valera studies an algorithm of sorting an integer array. After studying the theory, he went on to the practical tasks. As a result, he wrote a program that sorts an array of n integers $a_1, a_2, ..., a_n$ in the non-decreasing order. The pseudocode of the program, written by Valera, is given below. The input of the program gets number n and array a.

```
loop integer variable i from 1 to n - 1
    loop integer variable j from i to n - 1
        if (a_j > a_{j+1}), then swap the values of elements a_j and a_{j+1}
```

But Valera could have made a mistake, because he hasn't yet fully learned the sorting algorithm. If Valera made a mistake in his program, you need to give a counter-example that makes his program work improperly (that is, the example that makes the program sort the array not in the non-decreasing order). If such example for the given value of n doesn't exist, print -1.

Input

You've got a single integer n $(1 \le n \le 50)$ — the size of the sorted array.

Output

Print n space-separated integers $a_1, a_2, ..., a_n$ $(1 \le a_i \le 100)$ — the counter-example, for which Valera's algorithm won't work correctly. If the counter-example that meets the described conditions is impossible to give, print -1.

If there are several counter-examples, consisting of n numbers, you are allowed to print any of them.

Sample test(s)

input
1
output
-1

B. Increase and Decrease

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

Polycarpus has an array, consisting of n integers $a_1, a_2, ..., a_n$. Polycarpus likes it when numbers in an array match. That's why he wants the array to have as many equal numbers as possible. For that Polycarpus performs the following operation multiple times:

- he chooses two elements of the array a_i, a_j $(i \neq j)$;
- he simultaneously increases number a_i by 1 and decreases number a_j by 1, that is, executes $a_i = a_i + 1$ and $a_j = a_j$ - 1.

The given operation changes exactly two distinct array elements. Polycarpus can apply the described operation an infinite number of times.

Now he wants to know what maximum number of equal array elements he can get if he performs an arbitrary number of such operation. Help Polycarpus.

Input

The first line contains integer n $(1 \leq n \leq 10^5)$ — the array size. The second line contains space-separated integers $a_1, a_2, ..., a_n$ $(|a_i| \leq 10^4)$ — the original array.

Output

Print a single integer — the maximum number of equal array elements he can get if he performs an arbitrary number of the given operation.

Sample test(s)

input
2 2 1

output
1

input
3 1 4 1

output
3

C. Beauty Pageant

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

General Payne has a battalion of n soldiers. The soldiers' beauty contest is coming up, it will last for k days. Payne decided that his battalion will participate in the pageant. Now he has choose the participants.

All soldiers in the battalion have different beauty that is represented by a positive integer. The value a_i represents the beauty of the i-th soldier.

On each of k days Generals has to send a detachment of soldiers to the pageant. The beauty of the detachment is the sum of the beauties of the soldiers, who are part of this detachment. Payne wants to surprise the jury of the beauty pageant, so each of k days the beauty of the sent detachment should be unique. In other words, all k beauties of the sent detachments must be distinct numbers.

Help Payne choose k detachments of different beauties for the pageant. Please note that Payne cannot just forget to send soldiers on one day, that is, the detachment of soldiers he sends to the pageant should never be empty.

Input

The first line contains two integers n, k $(1 \le n \le 50; 1 \le k \le \frac{n(n+1)}{2})$ — the number of soldiers and the number of days in the pageant, correspondingly. The second line contains space-separated integers $a_1, a_2, ..., a_n$ $(1 \le a_i \le 10^7)$ — the beauties of the battalion soldiers.

It is guaranteed that Payne's battalion doesn't have two soldiers with the same beauty.

Output

Print k lines: in the i-th line print the description of the detachment that will participate in the pageant on the i-th day. The description consists of integer c_i $(1 \le c_i \le n)$ — the number of soldiers in the detachment on the i-th day of the pageant and c_i distinct integers $p_{1,i}, p_{2,i}, ..., p_{c_i,i}$ — the beauties of the soldiers in the detachment on the i-th day of the pageant. The beauties of the soldiers are allowed to print in any order.

Separate numbers on the lines by spaces. It is guaranteed that there is the solution that meets the problem conditions. If there are multiple solutions, print any of them.

Sample test(s)

input
3 3 1 2 3

output
1 1 1 2 2 3 2

input
2 1 7 12

output
1 12

D. Colorful Graph

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

You've got an undirected graph, consisting of n vertices and m edges. We will consider the graph's vertices numbered with integers from 1 to n. Each vertex of the graph has a color. The color of the i-th vertex is an integer c_i.

Let's consider all vertices of the graph, that are painted some color k. Let's denote a set of such as $V(k)$. Let's denote the value of the *neighbouring color diversity* for color k as the cardinality of the set $Q(k) = \{c_u : c_u \neq k$ and there is vertex v belonging to set $V(k)$ such that nodes v and u are connected by an edge of the graph$\}$.

Your task is to find such color k, which makes the cardinality of set $Q(k)$ maximum. In other words, you want to find the color that has the most diverse neighbours. Please note, that you want to find such color k, that the graph has at least one vertex with such color.

Input

The first line contains two space-separated integers n, m $(1 \leq n, m \leq 10^5)$ — the number of vertices end edges of the graph, correspondingly. The second line contains a sequence of integers $c_1, c_2, ..., c_n$ $(1 \leq c_i \leq 10^5)$ — the colors of the graph vertices. The numbers on the line are separated by spaces.

Next m lines contain the description of the edges: the i-th line contains two space-separated integers a_i, b_i $(1 \leq a_i, b_i \leq n;\ a_i \neq b_i)$ — the numbers of the vertices, connected by the i-th edge.

It is guaranteed that the given graph has no self-loops or multiple edges.

Output

Print the number of the color which has the set of neighbours with the maximum cardinality. It there are multiple optimal colors, print the color with the minimum number. Please note, that you want to find such color, that the graph has at least one vertex with such color.

Sample test(s)

input

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

output

```
3
```

input

```
5 6
4 2 5 2 4
1 2
2 3
3 1
5 3
5 4
3 4
```

output

```
2
```

E. Blood Cousins Return

time limit per test: 3 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Polycarpus got hold of a family tree. The found tree describes the family relations of n people, numbered from 1 to n. Every person in this tree has at most one direct ancestor. Also, each person in the tree has a name, the names are not necessarily unique.

We call the man with a number a a 1-ancestor of the man with a number b, if the man with a number a is a direct ancestor of the man with a number b.

We call the man with a number a a k-ancestor $(k > 1)$ of the man with a number b, if the man with a number b has a 1-ancestor, and the man with a number a is a $(k - 1)$-ancestor of the 1-ancestor of the man with a number b.

In the tree the family ties do not form cycles. In other words there isn't a person who is his own direct or indirect ancestor (that is, who is an x-ancestor of himself, for some x, $x > 0$).

We call a man with a number a the k-son of the man with a number b, if the man with a number b is a k-ancestor of the man with a number a.

Polycarpus is very much interested in how many sons and which sons each person has. He took a piece of paper and wrote m pairs of numbers v_i, k_i. Help him to learn for each pair v_i, k_i the number of distinct names among all names of the k_i-sons of the man with number v_i.

Input

The first line of the input contains a single integer n $(1 \le n \le 10^5)$ — the number of people in the tree. Next n lines contain the description of people in the tree. The i-th line contains space-separated string s_i and integer r_i $(0 \le r_i \le n)$, where s_i is the name of the man with a number i, and r_i is either the number of the direct ancestor of the man with a number i or 0, if the man with a number i has no direct ancestor.

The next line contains a single integer m $(1 \le m \le 10^5)$ — the number of Polycarpus's records. Next m lines contain space-separated pairs of integers. The i-th line contains integers v_i, k_i $(1 \le v_i, k_i \le n)$.

It is guaranteed that the family relationships do not form cycles. The names of all people are non-empty strings, consisting of no more than 20 lowercase English letters.

Output

Print m whitespace-separated integers — the answers to Polycarpus's records. Print the answers to the records in the order, in which the records occur in the input.

Sample test(s)

input

```
6
pasha 0
gerald 1
gerald 1
valera 2
igor 3
olesya 1
5
1 1
1 2
1 3
3 1
6 1
```

output

```
2
2
0
1
0
```

input

```
6
valera 0
valera 1
valera 1
gerald 0
valera 4
kolya 4
7
1 1
1 2
2 1
2 2
4 1
5 1
6 1
```

output

```
1
0
0
0
2
0
0
```

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