A. Leha and Function

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

Leha like all kinds of strange things. Recently he liked the function $F(n, k)$. Consider all possible k-element subsets of the set $[1, 2, \ldots, n]$. For subset find minimal element in it. $F(n, k)$ — mathematical expectation of the minimal element among all k-element subsets.

But only function does not interest him. He wants to do interesting things with it. Mom brought him two arrays A and B, each consists of m integers. For all i, j such that $1 \le i, j \le m$ the condition $A_i \ge B_j$ holds. Help Leha rearrange the numbers in the array A so that the sum $\sum_{i=1}^{m} F(A'_i, B_i)$ is maximally possible, where A' is already rearranged array.

Input

First line of input data contains single integer m $(1 \le m \le 2 \cdot 10^5)$ — length of arrays A and B.

Next line contains m integers $a_1, a_2, \ldots, a_m$ $(1 \le a_i \le 10^9)$ — array A.

Next line contains m integers $b_1, b_2, \ldots, b_m$ $(1 \le b_i \le 10^9)$ — array B.

Output

Output m integers $a'_1, a'_2, \ldots, a'_m$ — array A' which is permutation of the array A.

Examples

input

```
5
7 3 5 3 4
2 1 3 2 3
```

output

```
4 7 3 5 3
```

input

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

output

```
2 6 4 5 8 8 6
```

B. Leha and another game about graph

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

Leha plays a computer game, where is on each level is given a connected graph with n vertices and m edges. Graph can contain multiple edges, but can not contain self loops. Each vertex has an integer d_i, which can be equal to 0, 1 or -1. To pass the level, he needs to find a «good» subset of edges of the graph or say, that it doesn't exist. Subset is called «good», if by by leaving only edges from this subset in the original graph, we obtain the following: for every vertex i, $d_i = -1$ or it's degree modulo 2 is equal to d_i. Leha wants to pass the game as soon as possible and ask you to help him. In case of multiple correct answers, print any of them.

Input

The first line contains two integers n, m ($1 \le n \le 3 \cdot 10^5$, $n - 1 \le m \le 3 \cdot 10^5$) — number of vertices and edges.

The second line contains n integers $d_1, d_2, ..., d_n$ ($-1 \le d_i \le 1$) — numbers on the vertices.

Each of the next m lines contains two integers u and v ($1 \le u, v \le n$) — edges. It's guaranteed, that graph in the input is connected.

Output

Print -1 in a single line, if solution doesn't exist. Otherwise in the first line k — number of edges in a subset. In the next k lines indexes of edges. Edges are numerated in order as they are given in the input, starting from 1.

Examples

input
```
1 0
1
```
output
```
-1
```

input
```
4 5
0 0 0 -1
1 2
2 3
3 4
1 4
2 4
```
output
```
0
```

input
```
2 1
1 1
1 2
```
output
```
1
1
```

input
```
3 3
0 -1 1
1 2
2 3
1 3
```
output
```
1
2
```

Note

In the first sample we have single vertex without edges. It's degree is 0 and we can not get 1.

C. On the Bench

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

A year ago on the bench in public park Leha found an array of n numbers. Leha believes that permutation p is right if for all $1 \le i < n$ condition, that $a_{p_i} \cdot a_{p_{i+1}}$ is not perfect square, holds. Leha wants to find number of right permutations modulo $10^9 + 7$.

Input

First line of input data contains single integer n $(1 \le n \le 300)$ — length of the array.

Next line contains n integers $a_1, a_2, \dots, a_n$ $(1 \le a_i \le 10^9)$ — found array.

Output

Output single integer — number of right permutations modulo $10^9 + 7$.

Examples

input

```
3
1 2 4
```

output

```
2
```

input

```
7
5 2 4 2 4 1 1
```

output

```
144
```

Note

For first example:

$[1, 2, 4]$ — right permutation, because 2 and 8 are not perfect squares.

$[1, 4, 2]$ — wrong permutation, because 4 is square of 2.

$[2, 1, 4]$ — wrong permutation, because 4 is square of 2.

$[2, 4, 1]$ — wrong permutation, because 4 is square of 2.

$[4, 1, 2]$ — wrong permutation, because 4 is square of 2.

$[4, 2, 1]$ — right permutation, because 8 and 2 are not perfect squares.

D. Destiny

time limit per test: 2.5 seconds
memory limit per test: 512 megabytes
input: standard input
output: standard output

Once, Leha found in the left pocket an array consisting of n integers, and in the right pocket q queries of the form l r k. If there are queries, then they must be answered. Answer for the query is minimal x such that x occurs in the interval l r strictly more than $\frac{r-l+1}{k}$ times or -1 if there is no such number. Help Leha with such a difficult task.

Input

First line of input data contains two integers n and q ($1 \le n, q \le 3 \cdot 10^5$) — number of elements in the array and number of queries respectively.

Next line contains n integers $a_1, a_2, \ldots, a_n$ ($1 \le a_i \le n$) — Leha's array.

Each of next q lines contains three integers l, r and k ($1 \le l \le r \le n, 2 \le k \le 5$) — description of the queries.

Output

Output answer for each query in new line.

Examples

input

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

output

```
1
-1
```

input

```
5 3
1 2 1 3 2
2 5 3
1 2 3
5 5 2
```

output

```
2
1
2
```

E. In a Trap

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

Lech got into a tree consisting of n vertices with a root in vertex number 1. At each vertex i written integer a_i. He will not get out until he answers q queries of the form u v. Answer for the query is maximal value $a_i \oplus dist(i, v)$ among all vertices i on path from u to v including u and v, where $dist(i, v)$ is number of edges on path from i to v. Also guaranteed that vertex u is ancestor of vertex v. Leha's tastes are very singular: he believes that vertex is ancestor of itself.

Help Leha to get out.

The expression $x \oplus y$ means the bitwise exclusive `OR` to the numbers x and y.

Note that vertex u is ancestor of vertex v if vertex u lies on the path from root to the vertex v.

Input

First line of input data contains two integers n and q ($1 \le n \le 5 \cdot 10^4$, $1 \le q \le 150\,000$) — number of vertices in the tree and number of queries respectively.

Next line contains n integers $a_1, a_2, \ldots, a_n$ ($0 \le a_i \le n$) — numbers on vertices.

Each of next n - 1 lines contains two integers u and v ($1 \le u, v \le n$) — description of the edges in tree.

Guaranteed that given graph is a tree.

Each of next q lines contains two integers u and v ($1 \le u, v \le n$) — description of queries. Guaranteed that vertex u is ancestor of vertex v.

Output

Output q lines — answers for a queries.

Examples

input

```
5 3
0 3 2 1 4
1 2
2 3
3 4
3 5
1 4
1 5
2 4
```

output

```
3
4
3
```

input

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

output

```
5
5
4
3
```