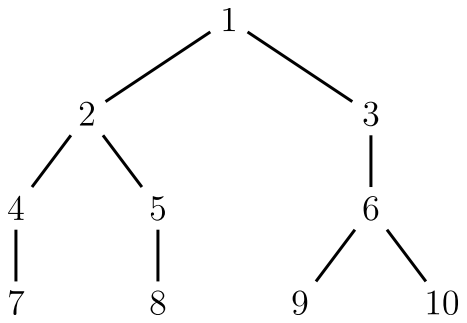
COCI '20 Contest 3 #5 Specijacija

Time limit: 4.0s **Memory limit:** 1G

You are given a positive integer n and a sequence $a_1, a_2, \ldots, a_n$ of positive integers, such that $\frac{i(i-1)}{2} < a_i \leq \frac{i(i+1)}{2}$.

The sequence parameterizes a tree with $\frac{(n+1)(n+2)}{2}$ vertices, consisting of $n+1$ levels with $1, 2, \ldots, n+1$ vertices, in the following way:



The tree parameterized by $a = (1, 2, 6)$.

The i-th level contains vertices $\frac{i(i-1)}{2} + 1, \ldots, \frac{i(i+1)}{2}$. The vertex a_i has two children, and the rest of the vertices on the level have one child each.

We want to answer q queries of the form "what is the largest common ancestor of x and y", i.e. the vertex with the largest label which is an ancestor of both x and y.

Input

The first line contains integers n, q and t $(1 \leq n, q \leq 200\,000, t \in \{0, 1\})$, the number of parameters, the number of queries, and a value which will be used to determine the labels of vertices in the queries.

The second line contains a sequence of n integers a_i $(\frac{i(i-1)}{2} < a_i \leq \frac{i(i+1)}{2})$ which parameterize the tree.

The i-th of the following q lines contains two integers $\tilde{x_i}$ and $\tilde{y_i}$ $(1 \leq \tilde{x_i}, \tilde{y_i} \leq \frac{(n+1)(n+2)}{2})$ which will be used to determine the labels of vertices in the queries.

Let z_i be the answer to the i-th query, and let $z_0 = 0$. The labels in the i-th query x_i and y_i are:

$$x_i = \left((\tilde{x_i} - 1 + t \cdot z_{i-1}) \bmod \frac{(n+1)(n+2)}{2} \right) + 1,$$
$$y_i = \left((\tilde{y_i} - 1 + t \cdot z_{i-1}) \bmod \frac{(n+1)(n+2)}{2} \right) + 1,$$

where mod is the remainder of integer division.

Remark: Note that if $t = 0$, it holds $x_i = \tilde{x_i}$ and $y_i = \tilde{y_i}$, so all queries are known from input. If $t = 1$, the queries are not known in advance, but are determined using answers to previous queries.

Output

Output q lines. In the i-th line, output the largest common ancestor of x_i and y_i.

Scoring

Subtask	Score	Constraints
1	10	$q = 1, t = 0$
2	10	$n \leq 1000, t = 0$
3	30	$t = 0$
4	60	$t = 1$

Sample Input 1

```
3 5 0
1 2 6
7 10
8 5
6 2
9 10
2 3
```

Sample Output 1

```
1
5
1
6
1
```

Explanation for Sample Output 1

The tree from Sample Input 1 is shown in the figure in the statement.

Sample Input 2

```
3 5 1
1 2 6
7 10
8 5
6 2
9 10
2 3
```

Sample Output 2

```
1
6
2
1
1
```

Explanation for Sample Output 2

The tree from Sample Input 2 is shown in the figure in the statement.

Labels of vertices in queries in the second example are:

$x_1 = 7, y_1 = 10$,
$x_2 = 9, y_2 = 6$,
$x_3 = 2, y_3 = 8$,
$x_4 = 1, y_4 = 2$,
$x_5 = 3, y_5 = 4$.