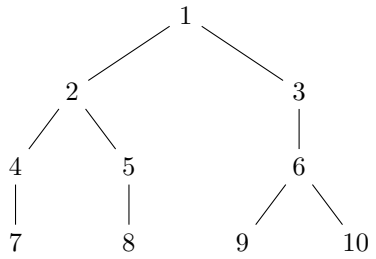
Task Specijacija

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 $\widetilde{x}_i$ and $\widetilde{y}_i$ ($1 \leq \widetilde{x}_i, \widetilde{y}_i \leq \frac{(n+1)(n+2)}{2}$) 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:

$$x_i = \left((\widetilde{x}_i - 1 + t \cdot z_{i-1}) \bmod \tfrac{(n+1)(n+2)}{2}\right) + 1,$$
$$y_i = \left((\widetilde{y}_i - 1 + t \cdot z_{i-1}) \bmod \tfrac{(n+1)(n+2)}{2}\right) + 1,$$

where mod is the remainder of integer divison.

Remark: Note that if $t = 0$, it holds $x_i = \widetilde{x}_i$ and $y_i = \widetilde{y}_i$, 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	Points	Constraints
1	10	$q = 1$, $t = 0$
2	10	$n \leq 1000$, $t = 0$
3	30	$t = 0$
4	60	$t = 1$

Examples

input

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

output

```
1
5
1
6
1
```

input

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

output

```
1
6
2
1
1
```

Clarification of the examples:

The tree from both examples is shown on the figure in the statement.

Labels of verticies in queries in the second example are:
$x_1 = 7,\ y_1 = 10,$
$x_2 = 9,\ y_2 = 6,$
$x_3 = 2,\ y_3 = 8,$
$x_4 = 1,\ y_4 = 2,$
$x_5 = 3,\ y_5 = 4.$