F. Power Tower

time limit per test: 4.5 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Priests of the Quetzalcoatl cult want to build a tower to represent a power of their god. Tower is usually made of power-charged rocks. It is built with the help of rare magic by levitating the current top of tower and adding rocks at its bottom. If top, which is built from k - 1 rocks, possesses power p and we want to add the rock charged with power w_k then value of power of a new tower will be $\{w_k\}^p$.

Rocks are added from the last to the first. That is for sequence $w_1, ..., w_m$ value of power will be

After tower is built, its power may be extremely large. But still priests want to get some information about it, namely they want to know a number called cumulative power which is the true value of power taken modulo m. Priests have n rocks numbered from 1 to n. They ask you to calculate which value of cumulative power will the tower possess if they will build it from rocks numbered $l, l+1, ..., r$.

Input

First line of input contains two integers n ($1 \le n \le 10^5$) and m ($1 \le m \le 10^9$).

Second line of input contains n integers w_k ($1 \le w_k \le 10^9$) which is the power of rocks that priests have.

Third line of input contains single integer q ($1 \le q \le 10^5$) which is amount of queries from priests to you.

k^{th} of next q lines contains two integers l_k and r_k ($1 \le l_k \le r_k \le n$).

Output

Output q integers. k-th of them must be the amount of cumulative power the tower will have if is built from rocks $l_k, l_k+1, ..., r_k$.

Example

input

```
6 1000000000
1 2 2 3 3 3
8
1 1
1 6
2 2
2 3
2 4
4 4
4 5
4 6
```

output

```
1
1
2
4
256
3
27
597484987
```

Note

$3^{27} = 7625597484987$