

D. 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, \dots, 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 $l, l + 1, \dots, r$.

Input

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

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

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

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

Output

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

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

$3^{27} = 7625597484987$