D. REQ

Today on a math lesson the teacher told Vovochka that the Euler function of a positive integer $\varphi(n)$ is an arithmetic function that counts the positive integers less than or equal to n that are relatively prime to n. The number 1 is coprime to all the positive integers and $\varphi(1) = 1$.

Now the teacher gave Vovochka an array of n positive integers $a_1, a_2, ..., a_n$ and a task to process q queries $l_i\ r_i$ — to calculate and print modulo $10^9 + 7$. As it is too hard for a second grade school student, you've decided to help Vovochka.

Input

The first line of the input contains number n ($1 \le n \le 200\,000$) — the length of the array given to Vovochka. The second line contains n integers $a_1, a_2, ..., a_n$ ($1 \le a_i \le 10^6$).

The third line contains integer q ($1 \le q \le 200\,000$) — the number of queries. Next q lines contain the queries, one per line. Each query is defined by the boundaries of the segment l_i and r_i ($1 \le l_i \le r_i \le n$).

Output

Print q numbers — the value of the Euler function for each query, calculated modulo $10^9 + 7$.

Examples

input

```
10
1 2 3 4 5 6 7 8 9 10
7
1 1
3 8
5 6
4 8
8 10
7 9
7 10
```

output

```
1
4608
8
1536
192
144
1152
```

input

```
7
24 63 13 52 6 10 1
6
3 5
4 7
1 7
2 4
3 6
2 6
```

output

```
1248
768
12939264
11232
9984
539136
```

Note

In the second sample the values are calculated like that:

- $\varphi(13 \cdot 52 \cdot 6) = \varphi(4056) = 1248$
- $\varphi(52 \cdot 6 \cdot 10 \cdot 1) = \varphi(3120) = 768$
- $\varphi(24 \cdot 63 \cdot 13 \cdot 52 \cdot 6 \cdot 10 \cdot 1) = \varphi(61326720) = 12939264$
- $\varphi(63 \cdot 13 \cdot 52) = \varphi(42588) = 11232$
- $\varphi(13 \cdot 52 \cdot 6 \cdot 10) = \varphi(40560) = 9984$
- $\varphi(63 \cdot 13 \cdot 52 \cdot 6 \cdot 10) = \varphi(2555280) = 539136$