

## Problem E. Egma Game

Input file: `stdin`  
Output file: `stdout`  
Time limit: 2 seconds  
Memory limit: 256 MB

As we all know, **TiChuot97** is *one of* the greatest professional gamers of all time. And, similar to other great gamers, he loves games, especially nim games. Today, he just found out an online nim game - Egma. As other nim games, Egma requires proficiency in computing mex values in order to master it. **TiChuot97** understands that, just like millions of other games he mastered, Egma requires practicing. This is where his best friend, **tourist**, comes in to help.

**tourist** has prepared a drill for **TiChuot97**'s practice. Initially, **TiChuot97** is given an array of size  $n$  of nonnegative integers  $a_1, a_2, \dots, a_n$ . Then, **tourist** will give **TiChuot97**  $q$  queries each consists of two numbers  $l, r$  ( $1 \leq l \leq r \leq n$ ) asking for the mex of  $\{a_l, a_{l+1}, \dots, a_r\}$ . Of course, **TiChuot97** finished this drill easily. However, he thinks that this challenge can improve, not only his mex-computing skill, but also his programming skill. Do you also want to give this challenge a try?

**Note:** Mex value of a set of nonnegative integers is defined to be the minimum nonnegative integer that does not belong to the set.

### Input

The first line contains an integer  $n$  ( $1 \leq n \leq 5 \times 10^5$ ), the length of the initial array. The second line contains  $n$  integers  $a_1, a_2, \dots, a_n$  ( $0 \leq a_i \leq 10^9$ ). The third line contains an integers  $q$  ( $1 \leq q \leq 5 \times 10^5$ ), the number of queries. Each of the next  $q$  lines contain a pair  $l, r$  ( $1 \leq l \leq r \leq n$ ) describing a query.

### Output

For each query, output on one line the answer to such query.

### Examples

| stdin     | stdout |
|-----------|--------|
| 5         | 0      |
| 1 2 3 0 5 | 4      |
| 2         |        |
| 1 3       |        |
| 1 4       |        |