

## I Intelligence Exploration

Time limit: 3s

John is a researcher working in the field of Artificial Intelligence. At the moment he needs to analyze reasoning abilities of a new Limitless Logic Machine, he wants to check how well it can understand when one thing implies another.

The scientist is planning to use a long array  $a$  consisting of zeroes and ones for his experiment. During the experiment, he will make multiple queries to the machine, where each query is defined by a pair  $l, r$ . For each query, the machine will be asked to compute the value of the implication of the subarray  $a_l \rightarrow a_{l+1} \rightarrow \dots \rightarrow a_r$ . John asks you, as his AI Application Project Junior Engineer, to compute the correct answers for these queries, so he can use them to validate his machine.



A picture of John. Generated using Microsoft Copilot Designer

The implication operator is defined as follows:

$x$	$y$	$x \rightarrow y$
0	0	1
0	1	1
1	0	0
1	1	1

In this problem, we assume a left-to-right evaluation order, so the order of the operations is  $((\dots((a_l \rightarrow a_{l+1}) \rightarrow a_{l+2}) \rightarrow \dots) \rightarrow a_r)$ .

### Input

The input consists of:

- One line with an integer  $n$  ( $2 \leq n \leq 10^5$ ), the size of the array.
- One line with  $n$  integers  $a$  ( $a \in \{0, 1\}$ ), the values in the array.
- One line with an integer  $q$  ( $1 \leq q \leq 10^5$ ), the number of queries.
- $q$  lines, each with two integers  $l$  and  $r$  ( $1 \leq l < r \leq n$ ), describing a query.

### Output

For each query, output the result of the corresponding implication.

**Sample Input 1**

```
5
0 0 1 1 0
5
1 2
2 3
4 5
3 4
1 5
```

**Sample Output 1**

```
1
1
0
1
0
```

**Sample Input 2**

```
7
1 0 0 0 1 0 0
5
1 3
4 7
2 4
3 6
1 7
```

**Sample Output 2**

```
1
1
0
0
1
```