

## Problem B. Bitwise Queries

Input file: *standard input*  
Output file: *standard output*  
Time limit: 3 seconds  
Memory limit: 512 mebibytes

You are given an array  $a$  of size  $n$  and you need to perform  $m$  queries on it. There are three types of queries:

1.  $\& l r x$ : change  $a_i$  to  $(a_i \text{ AND } x)$  for all  $i = l, l + 1, \dots, r$ ;
2.  $| l r x$ : change  $a_i$  to  $(a_i \text{ OR } x)$  for all  $i = l, l + 1, \dots, r$ ;
3.  $? l r$ : find the minimal value among  $a_l, a_{l+1}, \dots, a_r$ .

Output the answers for all queries of the third type.

### Input

The first line contains one integer  $n$  ( $1 \leq n \leq 5 \cdot 10^5$ ) — the size of the array.

The second line contains  $n$  space-separated integers  $a_i$  ( $0 \leq a_i < 2^{30}$ ) — the elements of the array.

The third line contains one integer  $m$  ( $1 \leq m \leq 2 \cdot 10^5$ ) — the number of queries.

Next  $m$  lines contain descriptions of queries in the format described above. For all queries  $1 \leq l \leq r \leq n$ , for queries of the first and second types  $0 \leq x < 2^{30}$ .

### Output

For each query of the third type, print the answer on a separate line.

### Example

standard input	standard output
5	0
1 2 3 4 5	4
4	
& 1 2 6	
3 5 4	
? 1 2	
? 3 5	