Imagine you have an array of n integers $a = [a_0, a_1, a_2, \ldots, a_{n-1}]$. To find the extreme sum of them you have to do the following operations:

1. Create a new list $t = [a_0 + a_1, a_1 + a_2, \ldots, a_{n-2} + a_{n-1}]$.
2. Let $a = t$.
3. If a has only one element remaining, exit. Otherwise go to 1.

The last remaining element is the extreme sum for the given array. Extreme sum for $a = [1, 2, 4]$ is 9.

To find the extreme XOR Sum, you have to do **XOR operation** instead of addition operation (in the step 1 above).

You are given an array of integers a. You have to answer q queries. Each query has the form of 'b e'. You have to find the extreme XOR sum of the array $[a_b, a_{b+1}, a_{b+2} \ldots a_e]$.

Input

The first line contains T ($1 \leq T \leq 25$). For each test case:

- The first line contains n ($1 \leq n \leq 10^4$).
- The second line contains n integers denoting the array a. Each element of the array will be an integer between 0 and 10^9.
- The third line contains q ($1 \leq q \leq 30000$).
- Each of the next q lines contains two integers b and e ($0 \leq b \leq e < n$).

Output

For each test case, print the case number in the first line. In the next q lines, print a single line, the extreme XOR sum for the range $[b, e]$ for the corresponding query.

Sample Input

```
1
5
1 4 6 7 8
3
0 0
0 1
2 4
```

Sample Output

```
Case 1:
1
5
14
```