

Problem A. Maximum Bitwise OR

Input file: standard input
Output file: standard output
Time limit: 2 seconds
Memory limit: 256 megabytes

You have an array A with N integers $A[1], A[2], \dots, A[N]$. You are given Q queries. Each query consists of two integers L and R . Consider a new array B of length $R - L + 1$, such that $B[i] = A[L + i - 1]$ for all $1 \leq i \leq R - L + 1$. In one move, you can do the following in order:

1. Choose an index j such that $1 \leq j \leq R - L + 1$
2. Choose an integer i satisfying $2^i \leq B[j]$
3. Replace $B[j]$ with $B[j] \oplus (B[j] - 2^i)$, where $\oplus$ denotes the bitwise-xor operator.

The answer for the query is the maximum possible bitwise OR of all values in B , and the minimum number of moves required to obtain this value.

Input

The first line contains T , the number of testcases. Then the testcases follow.

The first line of each testcase contains two integers, N and Q .

The second line contains N space separated integers $A[1], A[2], \dots, A[N]$.

Each of the next Q lines contains two space separated integers L and R .

Constraints

- $1 \leq T \leq 10^5$
- $1 \leq N \leq 10^5$
- $1 \leq Q \leq 10^5$
- $0 \leq A[i] \leq 10^9$
- $1 \leq L \leq R \leq N$
- The sum of N over all testcases doesn't exceed 10^5
- The sum of Q over all testcases doesn't exceed 10^5

Output

For each testcase print Q lines, each line should contain 2 space separated integers, denoting maximum possible OR and the minimum number of moves required.

Example

standard input	standard output
1	15 2
3 2	15 0
10 10 5	
1 2	
1 3	