Problem E
Easy Query
Problem ID: easyquery

You are given an array a with n integers $a_1, a_2, \ldots, a_n$.

You need to answer q queries. In each query, you are given 4 integers ℓ, r, u and v ($1 \leq \ell \leq r \leq n, 1 \leq u \leq v \leq r - \ell + 1$):

- Consider the sub-array of a from index ℓ to index r, inclusive: $a_\ell, a_{\ell+1}, \ldots, a_r$.
- Let $s = [s_1, s_2, \ldots, s_{r-\ell+1}]$ be the array obtained by sorting the above sub-array in non-decreasing order. Please note that we do not change the order of any elements in the original array a, i.e. array a remains the same after every query.
- Let $t^{(i)}$ be the **set** of values which appears at least i times in $s_u, s_{u+1}, \ldots, s_v$.
- Let $f(t^{(i)})$ be the bitwise OR of all elements in $t^{(i)}$.
- The result of the query is $f(t^{(1)}) + f(t^{(2)}) + f(t^{(3)})$.

For example, let $a = [123, 3, 2, 2, 7, 2, 1, 5, 5, 7, 456]$. Consider the query with $\ell = 2, r = 10, u = 2, v = 8$:

- $s = [1, 2, 2, 2, 3, 5, 5, 7, 7]$.
- $t^{(1)} = \{2, 3, 5, 7\}$.
- $t^{(2)} = \{2, 5\}$.
- $t^{(3)} = \{2\}$.
- $f(t^{(1)}) = 2 \mid 3 \mid 5 \mid 7 = 7$.
- $f(t^{(2)}) = 2 \mid 5 = 7$.
- $f(t^{(3)}) = 2$.
- Result of the query is $7 + 7 + 2 = 16$.

Input

The first line of input contains T ($1 \leq T \leq 2 \cdot 10^5$) — the number of test cases.

T test cases follow, each consists of:

- The first line contains 2 integers n and q ($1 \leq n, q \leq 2 \cdot 10^5$).
- The second line contains exactly n integers, representing array a ($1 \leq a_i \leq 10^9$).

- In the next q lines, each line contains exactly 4 integers ℓ, r, u and v ($1 \le \ell \le r \le n, 1 \le u \le v \le r - \ell + 1$).

The sum of n over all T test cases does not exceed $2 \cdot 10^5$.
The sum of q over all T test cases does not exceed $2 \cdot 10^5$.

Output

For each test case, output exactly q lines, the i-th line contains exactly one integer — the answer to the i-th query.

Sample Input 1	Sample Output 1
1 11 3 123 3 2 2 7 2 1 5 5 7 456 2 10 2 8 1 1 1 1 1 4 1 3	16 123 5