Edit Peptide

Palindromic peptides prevail! At least according to Anna, but what else can you expect from a chemist with a palindromic name. Peptides are chemical compounds consisting of $N \geq 2$ amino acids linked in a chain. We number the amino acids from 0 to $N-1$ according to their position in the chain.

The reason why Anna is so enthusiastic about palindromic peptides is that their special spatial structure allows chemists to induce a reaction which swaps a pair of amino acids in the chain: acid 0 can be swapped with acid $N-1$, acid 2 can be swapped with acid $N-2$, and so on. However, editing the molecule structure too much may make the peptide unstable, thus it is not allowed to perform more than K swaps.

Each amino acid has some potential energy P_i, represented by a nonnegative integer. Anna wants to perfom Q experiments. In each experiment, she wants to maximize the total potential energy of the amino acids over some contiguous segment of the chain. That is, for a given interval $[l, r]$ $(0 \leq l \leq r < N)$, she wants to maximize the sum $P_l + P_{l+1} + \ldots + P_r$ by performing at most K palindromic swaps.

Anna starts each experiment with a new peptide molecule, and she uses the same type of molecule for each experiment. Given the description of the peptide and Q intervals, your task is to compute the maximum potential energy that Anna can achieve in each case. You have to compute the answers *online*, that is, you have to solve the problem for an interval first before learning the next interval (see the Input section for details).

Input

The first line of the input contains three integers N, K and Q $(2 \leq N, Q \leq 200\,000$ and $0 \leq K \leq N)$, the size of the peptide chain, the maximum number of swaps and the number of experiments.

The second line contains N integers P_i $(0 \leq P_i \leq 10^9)$, the potential energies of the acids.

Each of the next Q lines contains two integers.

- The first line contains the boundaries l and r for the first experiment $(0 \leq l \leq r < N)$.
- In the j-th line $(2 \leq j \leq Q)$ there are two integers s_j and t_j $(0 \leq s_j, t_j \leq 10^{18})$. Let a_{j-1} denote the correct answer to the $(j-1)$-th question. Then, the value of l and r for the j-th experiment are $s_j \oplus a_{j-1}$ and $t_j \oplus a_{j-1}$, respectively.

Here, $\oplus$ denotes the binary XOR operator.

Output

Print Q lines, where the j-th line $(1 \leq j \leq Q)$ contains the integer a_j, the maximum sum of potentials in the j-th experiment.

Examples

input	output
7 1 5 4 4 0 6 1 1 0 0 2 8 15 18 22 12 10 20 20	9 16 12 16 1

Explanation

The first interval is $[l, r] = [0, 2]$. The sum of potentials without any swaps is $4 + 4 + 0 = 8$ over this segment, which can be improved to $a_1 = 4 + 4 + 1 = 9$ by swapping acids 2 and 4.

The second interval is $[l, r] = [8 \oplus 9, 15 \oplus 9] = [1, 6]$. The sum of potentials without swaps is 12 which can be improved to $a_2 = 16$ by swapping acids 0 and 6.

The third interval is $[l, r] = [18 \oplus 16, 22 \oplus 16] = [2, 6]$. The sum of potentials without swaps is 8. There are two ways to improve this, either by swapping acids 0 and 6 or by swapping 1 and 5. Since $K = 1$, we are only allowed to make one swap, and swapping 0 and 6 is better, so $a_3 = 12$.

The fourth inteval is $[l, r] = [12 \oplus 12, 10 \oplus 12] = [0, 6]$, the whole peptide chain. The sum of potentials is 16 which cannot be improved by swapping a pair of acids, so $a_4 = 16$.

The fifth interval is $[l, r] = [20 \oplus 16, 20 \oplus 16] = [4, 4]$. The potential of acid 4 is 1, which cannot be improved by swapping acids 4 and 2. So we have $a_5 = 1$.