Problem C: Consecutive Card Game

GSPVH is attending a card game event. He is going to play the game called "Cards in a black box". If he wins the game, he will get a huge prize like a jackpot!

The game goes as follow. At the beginning, the host presents a black box with no cards inside. Then, he puts into the black box n cards. Each card has an integer written on it. The values written on these n cards are $v_1, v_2, \ldots, v_n$. After that, the host annouces a positive integer k.

Now, GSPVH plays a *warmup* round:

- GSPVH tells the host a positive integer t_0.
- The host randomly takes t_0 cards out of the black box.
- If among these cards, there are k cards whose numbers are k consecutive integers, GSPVH wins this round. In other words, GSPVH wins this round if there exists an integer x such that, for every integer y between x and $x + k - 1$ (inclusive), a card with value y is taken out. Otherwise, GSPVH loses this round.
- If GSPVH loses, the game ends immediately and GSPVH will not get any prizes. If GSPVH wins, all chosen cards are put back into the black box, and the game continues.

If the game is still on, GSPVH will play q more rounds consecutively. These rounds are numbered from 1 to q. The i-th round goes as below:

- The host annouces three integers l_i, r_i and c_i.
- For every integer j between l_i and r_i (inclusive), the host first removes **all** cards with value j inside the black box and **burns them forever**, then puts into the black box **exactly** c_i new cards with value j. In other words, after this step, for every integer j between l_i and r_i (inclusive), there are **exactly** c_i cards with value j.
- GSPVH tells the host a positive integer t_i.
- The host randomly takes t_i cards out of the black box.
- If among these cards, there are k cards whose numbers are k consecutive integers, GSPVH wins this round. Otherwise, GSPVH loses this round.
- If GSPVH loses, the game ends immediately and GSPVH will not get any prizes. If GSPVH wins, all chosen cards are put back into the black box, and the game continues.

GSPVH will get the prize only if GSPVH wins all these q rounds.

Please note that:

- In every round, the integer GSPVH tells must be less than or equal to the number of cards inside the black box.
- In every round, GSPVH decides the number of cards which will be taken out, but GSPVH can not control which exact cards will be taken out.
- The value k stays the same throughout the game.
- In every round, if GSPVH wins, all cards which are taken out will be put back into the black box before the next round. Hence, in every round, the set of cards inside the black box does not depend on which cards are taken out in previous rounds.

As the prize is huge, GSPVH wants a sure win. More precisely, in every round, GSPVH wants to choose the number of cards to be taken out so that, no matter which cards the host takes out, GSPVH wins for sure. Also, GSPVH wants the number he tells to be as small as possible.

Help GSPVH decide, for each round, the minimum number of cards to be taken out, so that GSPVH will surely get the prize!

Input

The first line contains three integers n, k and q $(1 \le n \le 10^6, 1 \le q \le 10^5, 1 \le k \le 5)$.

The second line contains n integers $v_1, v_2, \ldots, v_n$ $(-10^9 \le v_i \le 10^9)$.

In the last q lines, the i-th one contains three integers l_i, r_i and c_i $(-10^9 \le l_i \le r_i \le 10^9, 1 \le c_i \le 10^9)$.

It is guaranteed that, in every round, before GSPVH tells a number, the black box contains cards whose numbers are k consecutive integers.

Output

Print $q + 1$ integers, which are the minimum number of cards to ensure GSPVH's win in the *warmup* round, and q next rounds, respectively. Each integer is printed in a separate line.

Sample Explanation

In every turn, GSPVH must make sure that among cards which are taken out, there are $k = 2$ cards with consecutive integers.

In the *warmup* round, the black box contains 4 cards with values 1, 2, 4, 5. If 3 cards are taken out, among them, there must be either both 1 and 2 or both 4 and 5. Hence, GSPVH wins for sure.

In the first round, the black box contains 5 cards with values 1, 2, 4, 5, 8. In this case, the minimum number of cards to guarantee a win is 4.

In the second round, the black box contains 7 cards with values 1, 2, 4, 5, 6, 7, 8. Taking out 4 cards does not guarantee a win, as there might be the case $(1, 4, 6, 8)$. However, taking out 5 cards ensures a win, there are three possible cases:

- Both 1 and 2 are taken out.
- Exactly one of $(1, 2)$ and 4 of $(4, 5, 6, 7, 8)$ are taken out.
- All cards of $(4, 5, 6, 7, 8)$ are taken out.

Sample Input 1	Sample Output 1
4 2 2 1 2 4 5 8 8 1 6 7 1	3 4 5