

Water Bottles 3

There are N water bottles with **infinite** capacity lined up in a row, numbered from 1 to N from left to right, initially filled with W_i water.

Shor would like each water bottle to have at least X units of water in it.

To do this, he may repeat the following operation as many times as he wishes:

Add 1 unit of water to any water bottle of his choice.

For Q separate queries, you are to do the following:

Change the amount of water in bottle A_j to B_j .

Then, output the minimum number of operations needed for each water bottle to have at least X units of water in it.

Note that Shor just wants to know how many operations are needed, and he **DOES NOT** perform them.

The only changes to the amount of water are from the first step of the query. Note that the changes in the first step of the query **carry over** to future queries.

See the sample testcases for more clarity.

Input Format

The input consists of $Q + 2$ lines.

The first line consists of three integers, N , Q and X .

The next line consists of N integers, the initial values of W .

The next Q lines consist of one query each, in this format:

| |
|-------------|
| $A_j \ B_j$ |
|-------------|

Output Format

Your program must print to standard output.

The output should consist of Q lines.

For each query in order, you are to output the answer to that query on a new line.

Subtasks

For all test cases, the input will satisfy the following bounds:

- $1 \leq N, Q \leq 2 \cdot 10^5$
- $1 \leq A_i \leq N$
- $0 \leq W_i, B_j, X \leq 10^9$

Your program will be tested on input instances that satisfy the following restrictions:

| Subtask | Marks | Additional Constraints |
|---------|-------|---------------------------------|
| 1 | 31 | $0 \leq W_i, B_j \leq 1, X = 1$ |
| 2 | 38 | $N, Q \leq 10^3$ |
| 3 | 31 | No additional constraints |

Sample Testcase 1

Input:

```
5 3 1
0 0 1 0 1
4 1
3 0
5 0
```

Output:

```
2
3
4
```

Explanation:

After the first step of the first query, the amount of water is: $\{0, 0, 1, 1, 1\}$

The minimum number of operations Shor must perform is 2, as he adds 1 unit of water to bottle 1, and adds 1 unit of water to bottle 2.

Note that he does not actually add 1 unit of water to bottle 1 and 2, so the array remains as $\{0, 0, 1, 1, 1\}$ after the first query.

After the first step of the second query, the amount of water is: $\{0, 0, 0, 1, 1\}$

The minimum number of operations Shor must perform is 3, as he adds 1 unit of water to bottle 1, adds 1 unit of water to bottle 2 and adds 1 unit of water to bottle 3.

Note that he does not actually add 1 unit of water to bottle 1, 2 and 3, so the array remains as $\{0, 0, 0, 1, 1\}$ after the second query.

After the first step of the third query, the amount of water is: $\{0, 0, 0, 1, 0\}$

The minimum number of operations Shor must perform is 4, as he adds 1 unit of water to bottle 1, adds 1 unit of water to bottle 2, adds 1 unit of water to bottle 3, and adds 1 unit of water to bottle 5.

Note that he does not actually add 1 unit of water to bottle 1, 2, 3 and 5, so the array remains as $\{0, 0, 0, 1, 0\}$ after the second query.

Sample Testcase 2

Input:

```
5 3 11
19 8 17 3 0
4 999
3 7
2 9
```

Output:

```
14
18
17
```

Explanation:

After the first step of the first query, the amount of water is: $\{19, 8, 17, 999, 0\}$

The minimum number of operations Shor must perform is 14.

He must use 3 operations on water bottle 2, and 11 operations on water bottle 5.

Note that he does not actually add water to bottle 2 and 5, so the array remains as $\{19, 8, 17, 999, 0\}$ after the first query.

After the first step of the second query, the amount of water is: $\{19, 8, 7, 999, 0\}$

The minimum number of operations Shor must perform is 18.

He must use 3 operations on water bottle 2, 4 operations on water bottle 3, and 11 operations on water bottle 5.

Note that he does not actually add water to bottle 2, 3 and 5, so the array remains as $\{19, 8, 7, 999, 0\}$ after the second query.

After the first step of the third query, the amount of water is: $\{19, 9, 7, 999, 0\}$

The minimum number of operations Shor must perform is 17.

He must use 2 operations on water bottle 2, 4 operations on water bottle 3, and 11 operations on water bottle 5.

Note that he does not actually add water to bottle 2, 3 and 5, so the array remains as $\{19, 9, 7, 999, 0\}$ after the third query.