Ladybugs II

Input File: `ladyin.txt`
Output File: `ladyout.txt`

Time and Memory Limits: 1 second, 1 GB

The **N** royal ladybugs of Ragden live up on the highest branch of the Great Tree. The **i**th ladybug lives in their palace $\mathbf{P_i}$ millimetres from the left end of the branch. No two ladybugs live at the same position on the branch.

The queen has asked you to collect the signatures of **K different ladybugs** to pass her latest bill, in as little time as possible. First, the queen will fly you up and drop you somewhere on the branch. Then, moving at the bristling pace of one millimetre per second, you will set upon your task of collecting **K** signatures. It takes no time at all to collect a signature (you are very persuasive), so you only need to account for the time taken to move. Once you have collected **K** signatures, your task is done and you will jump off the branch, activating your parachute.

The queen has not yet decided where she will initially drop you on the branch. Thus, she has prepared **Q** scenarios. In the **i**th scenario, she will drop you $\mathbf{D_i}$ millimetres from the left end of the branch.

In each scenario, what is the least amount of time it will take you to collect **K** signatures?

Input

- The first line of input contains the three integers **N**, **K** and **Q**.
- The second line of input contains **N** integers. The **i**th of these integers is $\mathbf{P_i}$, describing the location of the **i**th ladybug, in ascending order.
- The third line of input will contain **Q** integers. The **i**th of these integers is $\mathbf{D_i}$, the initial location the queen will drop you at in the **i**th scenario.

Output

Your program should output a single line containing **Q** integers. The **i**th of these integers should be the minimum amount of time it will take you to collect **K** signatures in the **i**th scenario.

Sample Input 1

```
3 2 3
1 4 6
0 5 2
```

Sample Output 1

```
4 3 4
```

Sample Input 2

```
4 4 2
3 4 6 8
3 6
```

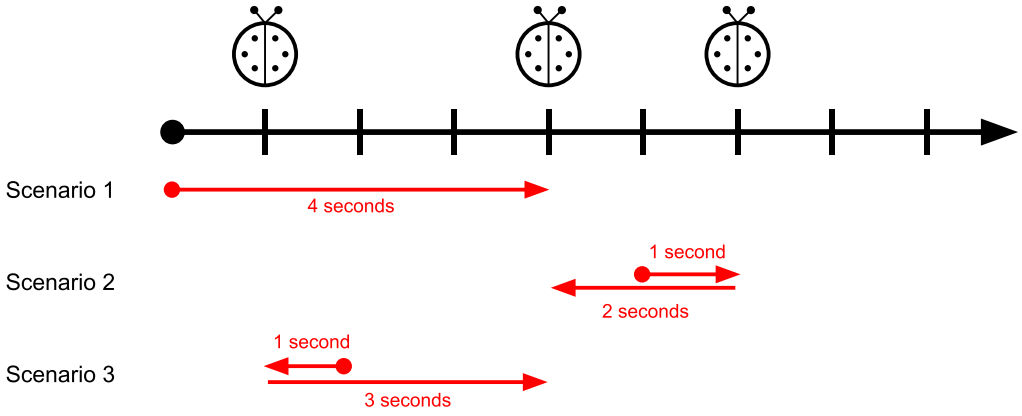
Sample Output 2

```
5 7
```

Explanation

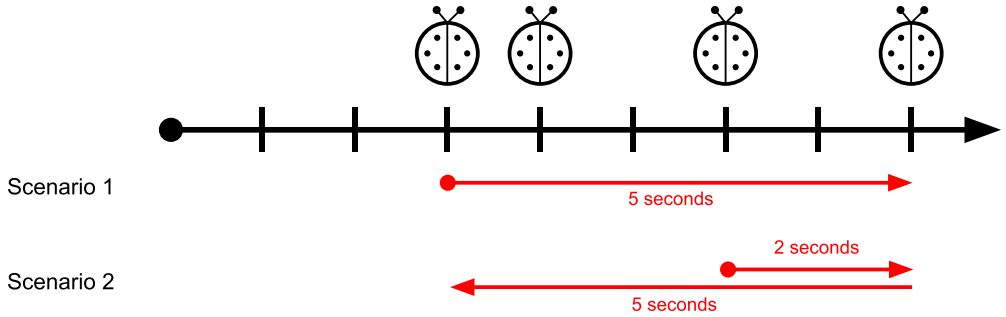
In the first sample input, there are $\mathbf{N = 3}$ ladybugs. The queen wants you to collect $\mathbf{K = 2}$ signatures. There are $\mathbf{Q = 3}$ scenarios:

- In the first scenario, the queen drops you off $\mathbf{P_1 = 0}$ millimetres from the left edge of the branch. The fastest way to collect 2 signatures is to walk to the right for 4 seconds, collecting signatures from the two ladybugs you pass.
- In the second scenario, the queen drops you off $\mathbf{P_2 = 5}$ millimetres from the left edge of the branch. The fastest way to collect 2 signatures is to walk to the right for 1 second to collect the first signature, then walk back to the left for 2 seconds to collect the second signature.
- In the third scenario, the queen drops you off $\mathbf{P_3 = 2}$ millimetres from the left edge of the branch. The fastest way to collect 2 signatures is to walk to the left for 1 second to collect the first signature, then walk back to the right for 3 seconds to collect the second signature.



In the second sample input, there are $\mathbf{N = 4}$ ladybugs. The queen wants you to collect $\mathbf{K = 4}$ signatures. There are $\mathbf{Q = 2}$ scenarios:

- In the first scenario, the queen drops you off $\mathbf{P_1 = 3}$ millimetres from the left edge of the branch. The fastest way to collect 4 signatures is to collect the one at the dropoff point, then walk to the right for 5 seconds, collecting the rest from the three ladybugs you pass.
- In the second scenario, the queen drops you off $\mathbf{P_2 = 6}$ millimetres from the left edge of the branch. The fastest way to collect 4 signatures is to immediately collect the signature of the ladybug at the dropoff point. Then, walk to the right for 2 seconds to collect the second signature, then walk back to the left for 5 seconds to collect the third and fourth signatures.



Subtasks & Constraints

For all test cases:

- $\mathbf{2 \le N \le 100\,000}$.
- $\mathbf{2 \le K \le N}$.
- $\mathbf{1 \le Q \le 100\,000}$.
- $\mathbf{0 \le P_i \le 1\,000\,000\,000}$, for all $\mathbf{i}$.
- $\mathbf{P_i < P_{i+1}}$, for all $\mathbf{i}$.
- $\mathbf{0 \le D_i \le 1\,000\,000\,000}$, for all $\mathbf{i}$.

Additionally:

- For Subtask 1 (15 marks), $\mathbf{Q = 1}$, $\mathbf{N \le 1\,000}$.
- For Subtask 2 (15 marks), $\mathbf{Q = 1}$.
- For Subtask 3 (15 marks), $\mathbf{K = N}$.
- For Subtask 4 (55 marks), there are no special constraints.

There are no hints available for this problem.