The King's Magical Array

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Problem - "The King's Magical Array"

Problem Statement

King Alex of ByteLand discovered an enchanted array with two magical operations:

1. **Add Operation**: Add an integer x to the array. Each number is added at most once (including the initial array).
2. **Magical Removal Operation**: Find the difference between the smallest and largest elements in the array, record this difference, and then remove both of these elements from the array.

Initially, the array contains some distinct integers. Process a sequence of operations and for each magical removal operation, output the recorded difference.

Input

- The first line contains an integer n ((1 <= n <= 3*10^5)), the number of elements in the initial array.
- The second line contains n distinct integers (a_1, a_2, . . . , a_n) ((1 <= a_i <= 3*10^5)), representing the initial array.
- The third line contains an integer q ((1 <= q <= 2*10^5)), the number of operations.
- Each of the next q lines contains either:
  - `"1 x"` — Add integer x (1<= x <= 3*10^5) to the array.
  - `"2"` — Perform a magical removal and print the difference between the smallest and largest elements. It is guaranteed that the array contains at least two elements when this operation is performed.

Output

For each magical removal operation, output the recorded difference on a new line.

```
10 8 2 7 1
5
2
1 11
1 3
2
2
```

Sample Output

Copy

```
9
9
5
```

Explanation

- **Initial Array:** ([10, 8, 7, 2, 1]) (sorted: ([1, 2, 7, 8, 10])).
- **Operation 1**: `"2"`
  - Smallest = 1, Largest = 10, difference = (10 - 1 = 9).
  - Array after removal: ([8, 7, 2]).
- **Operation 2**: `"1 11"`
  - Add 11 → Array becomes ([8, 7, 2, 11]).
- **Operation 3**: `"1 3"`
  - Add 3 → Array becomes ([8, 7, 2, 11, 3]) (sorted: ([2, 3, 7, 8, 11])).
- **Operation 4**: `"2"`
  - Smallest = 2, Largest = 11, difference = (11 - 2 = 9).
  - Array after removal: ([3, 7, 8]).
- **Operation 5**: `"2"`
  - Smallest = 3, Largest = 8, difference = (8 - 3 = 5).
  - Array after removal: ([7]).

Clarifications

Report an issue

No clarifications have been made at this time.