

Problem 5 - Alice's Bookshelf (100 pts)

Time Limit : 7 s

Memory Limit : 1024 MB

Problem Description

Alice loves reading books and has a bookshelf. For each book in her bookshelf, there's a number, indicating the corresponding priority. You have to maintain the sequence of the books' priority with operations specified in the Input section.

Input

The first line contains two numbers N, Q ($1 \leq N, Q \leq 8 \times 10^5$), indicating the number of books in the initial bookshelf and the number of operations.

The second line contains N integers, representing the priority of books in the bookshelf.

Each of the following Q lines contains one of the following operations, which can be identified with the first number in each line:

1. 1 p k : Insert a book with priority p *after* the k -th position. Note that the position index starts from 1. If $k = 0$, then insert it as the first book in the bookshelf.
2. 2 k : Delete the k -th book.
3. 3 1 r p : Increase the priorities of the books between the positions l and r by p (including books at position l and r , and $l \leq r$.) Note that p may be negative.
4. 4 1 r : Query the largest priority of books between the positions l and r (including books at position l and r , and $l \leq r$.)
5. 5 1 r : Reverse the order of books between the positions l and r (including books at position l and r , and $l \leq r$.)
6. 6: Remove the book with the largest priority.

You can assume that the given priorities can be stored in a 32-bit `int` variable and all operations are valid. Note that the bookshelf may become empty. When performing operation 6, if there are multiple books with the largest priority, you should remove the book with smallest position index.

Output

For each operation 4 in the sequence of given operations, the largest priority of books between the position l and r (inclusive) has to be printed out. You don't have to print anything for any other operation.

Subtask 1 (10 pts)

- $N, Q \leq 1000$.

Subtask 2 (20 pts)

- Only operation 1, 2, 4.

Subtask 3 (15 pts)

- No operation 5, 6.

Subtask 4 (10 pts)

- No operation 6.

Subtask 5 (15 pts)

- No operation 5.

Subtask 6 (10 pts)

- $N, Q \leq 10^5$.

Subtask 7 (20 pts)

- No other constraints.

Sample Input 1

5 5
9 5 1 -5 -3
2 5
1 5 4
4 3 4
6
4 2 2

Sample Output 1

1
1

Sample Input 2

6 10
-4 3 2 4 -2 4
3 2 4 -3
1 6 0
3 2 3 1
3 5 5 1
1 -3 3
3 4 7 5
2 3
2 6
2 2
4 2 5

Sample Output 2

7

Sample Input 3

```
10 10
-9 8 3 -8 -4 -8 -2 1 5 3
2 9
1 8 6
1 -7 10
4 4 6
6
4 1 4
1 3 4
2 3
1 9 9
4 5 9
```

Sample Output 3

```
-4
3
8
```

Hint

As you have to insert and delete the priority of books, you may be considering using a self-balancing binary search tree to maintain the sequence of priority. Now, how do you add *extra* information to the tree so that you can handle the other operations efficiently?