Cyclical Queries

You are given a directed graph with n nodes numbered from 1 to n. For every i from 1 to $n-1$, there is an edge from node i to node $i+1$ of weight w_i, and there is an edge from node n to node 1 of weight w_n. Thus, the n nodes form a directed cycle.

You have to process m queries of the following four types. In the following, x denotes a node between 1 and n. Also, some queries will attempt to add or delete nodes, but it's guaranteed that the original n nodes will never be deleted.

- $1\ x\ w$. Let the farthest node from x be y. Add an edge of weight w from y to a new node.
- $2\ x\ w$. Add an edge of weight w from x to a new node.
- $3\ x$. Let the farthest node from x be y. Delete node y.
- $4\ x$. Let the farthest node from x be y. Print the distance from x to y.

The *distance* from x to y is defined as the shortest total weight of any path from x to y. The *farthest node* from x is the node y with the largest distance from x.

Note: If multiple nodes are farthest from x, choose the one that was added to the graph most recently.

Complete the function `cyclicalQueries` which takes in an integer array w denoting the weights of the initial edges and an integer m and returns a list of answers to queries of type 4. You have to take the query information from standard input, as described in the input format section.

Input Format

The first line contains a single integer n.

The next line contains n space-separated integers $w_1, w_2, \ldots, w_n$.

The next line contains a single integer m denoting the number of queries. m lines follow, where the i^{th} line denotes the i^{th} query, each in the format described above.

Constraints

- $1 \le n, m \le 10^5$
- $1 \le w, w_i \le 10^9$
- $1 \le x \le n$

Output Format

For each query of type 4, print the answer in a single line.

Sample Input 0

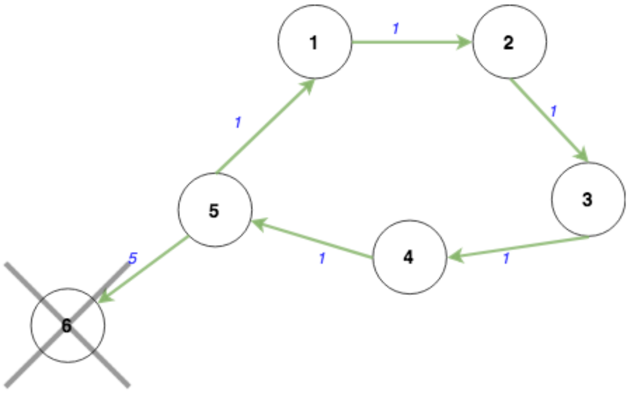
```
5
1 1 1 1 1
4
1 1 5
4 2
3 2
4 2
```

Sample Output 0

```
8
4
```

Explanation 0

- Query 1: A new node is added from node 5, with an edge weight of 5. We label this new node 6 in the diagram below.
- Query 2: Distance from node 2 to node 6 is printed.
- Query 3: Node 6 is deleted.
- Query 4: Distance from node 2 to node 1 is printed.


1
1
2
1
1
3
5
1
4
1
5
6