SPEED FRIENDING

Congratulations on being hired as a tutor at December camp! The students have just arrived and your first job is to run icebreaker activities.

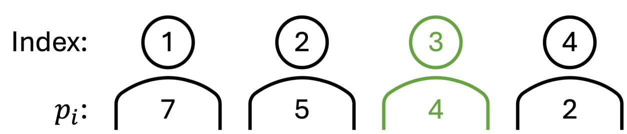
There are N students standing in a line, and you have just numbered them 1 to N from left to right. Additionally, each student has told you their **distinct** personality value p_i. From the tutor briefing, you know that students with closer personality values become friends faster.

This year, the students will perform *speed-friending scenarios*. Each speed-friending scenario is started by a student s. Initially, student s is not friends with any other students. Then, student s will become friends with the other students one at a time as follows:

- If student s has no student to their left, then they befriend the closest student to their right.
- If student s has no student to their right, then they befriend the closest student to their left.
- Otherwise, let l be the closest student to their left, and r be the closest student to their right. Student s will befriend the student that has the closer personality value to their own. In particular:
  - If $|p_s - p_l| < |p_s - p_r|$[1], then they befriend student l.
  - If $|p_s - p_l| > |p_s - p_r|$, then they befriend student r.
  - Otherwise, if $|p_s - p_l| = |p_s - p_r|$, then student s can pick either l or r to befriend.

After student s befriends another student, that student leaves the line and the process repeats. This continues until student s has befriended everyone. The *final friend* is the student who was befriended last. Note that the final friend may depend on the choices made by student s.

Consider the following example with $N = 4$ students and $s = 3$.



Student 3 considers $l = 2$ and $r = 4$. Since $|p_s - p_l| = |4 - 5| = 1$ and $|p_s - p_r| = |4 - 2| = 2$, student 3 befriends l (student 2) first.

Now, $l = 1$ and $r = 4$. Since $|p_s - p_l| = |4 - 7| = 3$ and $|p_s - p_r| = |4 - 2| = 2$, student 3 befriends r (student 4) next.

Student 3 has no student to their right, and so they befriend student 1. Student 1 is the final friend. This concludes the example.

[1]The notation $|x|$ denotes the absolute value of x. The absolute value of a number is equivalent to its distance from 0. For example, $|2| = |-2| = 2$.

You must support Q operations, numbered from 1 to Q. Each operation has a value t_i, which is either 1 or 2:

- If $t_i = 1$, then you are additionally given a value s_i. You will run a speed-friending scenario starting at student s_i. Output the index of the final friend, or -1 if there are multiple possibilities for the final friend.
- If $t_i = 2$, then you are additionally given two values s_i and x_i. This means that the personality value of student s_i has changed to x_i.

After each speed-friending scenario, every student returns to their original position in the line and forgets their past friendships.

Subtasks and Constraints

For all subtasks:

- $2 \le N \le 200\,000$.
- $1 \le Q \le 200\,000$.
- $0 \le p_i \le 1\,000\,000\,000$ for all i.
- $t_i = 1$ or $t_i = 2$ for all i.
- $1 \le s_i \le N$ for all i.
- $0 \le x_i \le 1\,000\,000\,000$ for all i.
- Initially, and after each operation, the students have distinct personality values. In particular, $p_i \neq p_j$ for all $i \neq j$.

Additional constraints for each subtask are given below.

Subtask	Points	Additional constraints
1	20	$Q = 1$, $t_1 = 1$, and $p_{s_1} = 0$.
2	15	$Q = 1$ and $t_1 = 1$.
3	35	$t_i = 1$ for all i.
4	30	No additional constraints.

Input

- The first line of input contains the integer N.
- The second line of input contains N integers describing the initial personality values of the students. They are $p_1, p_2, \ldots, p_N$.
- The third line of input contains the integer Q.
- The next Q lines of input describe the operations. The ith line depends on the value of t_i:
  - If $t_i = 1$, then the line contains the two integers t_i and s_i
  - If $t_i = 2$, then the line contains the three integers t_i, s_i, and x_i.

Output

Output one line for each operation with $t_i = 1$. This line should contain a single integer: the index of the final friend, or -1 if there are multiple possibilities for the final friend.

Sample Input 1

```
4
7 5 4 2
1
1 3
```

Sample Output 1

```
1
```

Sample Input 2

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

Sample Output 2

```
-1
1
3
```

Explanation

The first sample case corresponds to the example on the first page.

The second sample case has $Q = 5$ operations:

- The first operation has $t_1 = 1$ and $s_1 = 2$. Since $|p_s - p_l| = |p_s - p_r| = 2$, student 2 can choose to befriend either student 1 or student 3. The final friend depends on this choice, and so the answer is -1.
- The second operation has $t_2 = 2$, $s_2 = 3$, and $x_2 = 4$. This sets $p_3 = 4$.
- The third operation has $t_3 = 1$ and $s_3 = 2$. Since $|p_s - p_l| = 2$ and $|p_s - p_r| = 1$, student 2 will initially befriend student $r = 3$. Therefore, student 1 is the final friend.
- The fourth operation has $t_4 = 2$, $s_4 = 3$, and $x_4 = 6$. This sets $p_3 = 6$.
- The fifth operation has $t_5 = 1$ and $s_5 = 2$. Since $|p_s - p_l| = 2$ and $|p_s - p_r| = 3$, student 2 will initially befriend student $l = 1$. Therefore, student 3 is the final friend.