

Problem A. Hero Wars

Problem Description

Halloween was approaching, and when Monkey finished his shift at the "Animal World Sanctuary" zoo, he strolled through the streets of the Xinyi district. He was surprised to see everyone dressed up as various monsters and creatures, as if he had stepped into a world filled with elaborate costumes. Monkey couldn't help but sigh, once again spending the holiday alone. However, as a hardworking office worker, he was exhausted and didn't have the energy to participate in Halloween activities.

When he got back home, he opened up YouTube. Since he had recently entered the workforce and couldn't afford to purchase YouTube Premium, he had to endure some advertisements. At that moment, he watched an ad. In the video, the protagonist, starting from a very low initial level, challenged monsters under a big demon's attack and gradually leveled up until rescuing the princess. But as you may know, the ad suddenly ended halfway through, and the protagonist didn't even have time to save the princess.

To get into the Halloween spirit, Monkey downloaded the game and started playing. However, after a long day at the office, he gradually grew tired and eventually collapsed halfway through the game. When he opened his eyes again, he found himself in the virtual world of this Halloween game. It turned out he had been reincarnated, and he was the main character. In front of him were numerous monsters, each dressed in Halloween costumes.

Starting from his initial level, Monkey had to face n Halloween monsters, with v_i representing the level of the i^{th} monster. When Monkey's level was greater than or equal to the level of a Halloween monster, he could challenge that monster and absorb its level, causing the monster to disappear permanently in that reincarnation. He can challenge the monsters in **any order**. When Monkey's level reached the target level, he would win the reincarnation world and complete the game.

Monkey went through multiple cycles of reincarnation, with a total of q reincarnations. In each reincarnation, the Halloween monsters were reset to their original levels and quantities. However, Monkey's initial level x_i and target level y_i were different for each reincarnation.

Considering that Monkey was exhausted and wanted to breeze through the game, can you help him determine the minimum number of challenges required to complete each reincarnation? If it's not possible to complete the game, please answer with -1 .

Input Format

- line 1: $n \ q$
- line 2: $v_1 \ v_2 \ \dots \ v_n$
- line $2 + i \ (1 \leq i \leq q)$: $x_i \ y_i$

Output Format

- line $i \ (1 \leq i \leq q)$: the minimum number of challenges required to complete i^{th} reincarnation.

Constraints

- $1 \leq n \leq 100\,000$.
- $1 \leq q \leq 100\,000$.
- $1 \leq v_i \leq 10^9$ for $i = 1, 2, \dots, n$.
- $1 \leq x_i < y_i \leq 10^{14}$ for $i = 1, 2, \dots, q$.
- All input values are integers.

Subtasks

1. (15 points) $v_i \leq v_{i+1} \leq 2 \cdot v_i$ for $i = 1, 2, \dots, n - 1$.
2. (30 points) $n \leq 3000$; $q \leq 3000$.
3. (25 points) $x_i \geq 10^9$ for $i = 1, 2, \dots, q$.
4. (30 points) No additional constraints.

| No. | Testdata Range | Time Limit (ms) | Memory Limit (KiB) |
|---------|----------------|-----------------|--------------------|
| Samples | 1-3 | 1000 | 262144 |
| 1 | 4-12 | 1000 | 262144 |
| 2 | 13-21 | 1000 | 262144 |
| 3 | 22-27 | 1000 | 262144 |
| 4 | 1-40 | 1000 | 262144 |

Samples

Sample Input 1

```
6 2
2 4 8 16 32 64
1 50
9 50
```

This sample input satisfies the constraints of Subtasks 1, 2, 4.

Sample Output 1

```
-1
3
```

Sample Input 2

```
7 6
1 3 3 6 14 18 30
1 3
2 50
3 15
4 60
5 80
10 70
```

This sample input satisfies the constraints of Subtasks 2, 4.

Sample Output 2

```
-1
7
3
5
7
4
```

Sample Input 3

```
4 3
1 1000 1000000 10000000000
9998998998999 1000000000000000
9999999999999 1000000000000000
9876543210987 1000000000000000
```

This sample input satisfies the constraints of Subtasks 2, 3, 4.

Sample Output 3

```
-1
-1
-1
```