

# Batman Returns

Input file:            **standard input**  
Output file:           **standard output**  
Time limit:            2.5 seconds  
Memory limit:         256 megabytes

Gotham City consists of a single street, and there are  $n$  skyscrapers located along it. They are numbered from west to east with integers from 1 to  $n$ , the height of the  $i$ -th skyscraper is equal to  $h_i$  meters.

Every night Batman performs an observation flight over the city. He climbs on the roof of some skyscraper and glides down to the roof of some other skyscraper. Due to the strong permanent wind he is only able to flight westward, but his altitude remains almost the same. Thus, he is able to glide down from skyscraper  $q$  to skyscraper  $p$  if and only if  $p < q$  and  $h_p < h_q$ . Moreover, Batman is very manoeuvrable, so the height of the buildings between  $p$  and  $q$  don't matter. Batman cares a lot about the crime level in the city so he chooses such pair of valid  $p$  and  $q$  that  $q - p$  is maximum possible.

City authorities have developed  $m$  plans of city renewal. According to the  $i$ -th plan only skyscrapers from  $l_i$  to  $r_i$ , inclusive will remain on this street, while others will be destroyed. For each plan  $i$  Batman wants to know the optimal plan to observe the city, namely such  $p_i$  and  $q_i$  that  $l_i \leq p_i < q_i \leq r_i$ ,  $h_{p_i} < h_{q_i}$  and  $q_i - p_i$  is maximum possible.

## Input

The first line of the input contains one integer  $n$  ( $1 \leq n \leq 200\,000$ ) — number of skyscrapers on the street.

The second line contains  $n$  integers  $h_i$  ( $1 \leq h_i \leq 200\,000$ ) — heights of the skyscrapers.

Third line contains integer  $m$  ( $1 \leq m \leq 200\,000$ ) — the number of plans designed by the city authorities.

Each of the last  $m$  lines contains two integers  $l_i$  and  $r_i$  ( $1 \leq l_i < r_i \leq n$ ), denoting the range of the skyscrapers that will remain according to the  $i$ -th plan.

## Output

For each renewal plan you should print two integers — optimal  $p_i$  and  $q_i$ . If there is no possible observation flight at all, you should print `-1 -1`.

If there are many optimal answers, you may print any one of them.

## Examples

| standard input                                      | standard output          |
|---|--------------------------|
| 4<br>2 3 1 4<br>2<br>2 3<br>1 3                     | -1 -1<br>1 2             |
| 7<br>5 4 2 4 3 1 5<br>4<br>2 6<br>2 7<br>1 7<br>3 7 | 3 5<br>2 7<br>2 7<br>3 7 |

## Note

Consider the first sample test. In the first query the only two available skyscrapers have heights 3 and 1 but they are not valid since  $3 \geq 1$ . In the second query the pair consisting of the first and the second skyscrapers is valid since they have heights 2 and 3.

Consider the second sample test. In the first query the pair of skyscrapers with heights 2 and 3, and the pair of skyscrapers with heights 2 and 4 are valid. The distance between first two of them is greater so this pair produces the answer for this query.

## Scoring

Tests for this problem are divided into eleven groups. For each group you earn points only if your solution passes all tests in this group and all tests in all **previous** groups. **Offline evaluation** means that your submission will be evaluated on the tests of the group only after the end of the contest.

| Group | Tests   | Points | Additional constraints | Comments                  |
|-------|---------|--------|------------------------|---------------------------|
|       |         |        | $n, m$                 |                           |
| 0     | 1 – 2   | 0      | –                      | Sample tests              |
| 1     | 3 – 12  | 10     | $n, m \leq 100$        |                           |
| 2     | 13 – 22 | 10     | $n, m \leq 500$        |                           |
| 3     | 23 – 32 | 10     | $n, m \leq 1\,000$     |                           |
| 4     | 33 – 42 | 10     | $n, m \leq 2\,000$     |                           |
| 5     | 43 – 52 | 10     | $n, m \leq 5\,000$     |                           |
| 6     | 53 – 62 | 10     | $n, m \leq 10\,000$    |                           |
| 7     | 63 – 72 | 10     | $n, m \leq 20\,000$    |                           |
| 8     | 73 – 82 | 10     | $n, m \leq 50\,000$    |                           |
| 9     | –       | 10     | $n, m \leq 100\,000$   | <b>Offline evaluation</b> |
| 10    | –       | 10     | $n, m \leq 200\,000$   | <b>Offline evaluation</b> |