

Kick Start 2020 - Round D

Locked Doors

Problem

Bangles is preparing to go on a tour of her local museum. The museum is made up of N rooms in a row, numbered from 1 to N from left to right. The rooms are connected by $N-1$ locked doors, each connecting a pair of adjacent rooms. Each door has a *difficulty level* indicating how difficult it is for Bangles to open the door. No two doors will have the same difficulty level. The door between the i -th room and $(i+1)$ -th room has difficulty level D_i .

Bangles will pick one of the rooms to start in, and visit each of the rooms in the museum one at a time, taking pictures as she goes. She takes a picture in her starting room, then she repeats the following procedure until she has taken a picture in all the rooms: Of the two locked doors available to her, she will open the door with the lower difficulty level and take a picture in the newly unlocked room. If there is only one locked door available to her, then she will unlock that door. Once a door is unlocked, it remains unlocked.

Bangles is not yet sure which room she would like to start in, so she needs you to answer Q queries. For the i -th query, she would like to know: What is the K_i -th room that she will take a picture in if she starts in the S_i -th room?

Input

The first line of the input gives the number of test cases, T . T test cases follow. The first line of each test case contains the two integers N and Q . The second line contains $N-1$ integers, describing the locked doors. The i -th integer (starting from 1) is D_i . Then, Q lines follow, describing the queries. The i -th of these lines contains the two integers S_i and K_i .

Output

For each test case, output one line containing `Case #x: y`, where x is the test case number (starting from 1) and y is a list of the answers for the Q queries in order, separated by spaces.

Limits

Time limit: 40 seconds.

Memory limit: 1 GB.

$1 \leq T \leq 100$.

$1 \leq D_i \leq 10^5$, for all i .

All D_i are distinct.

$1 \leq S_i \leq N$, for all i .

$1 \leq K_i \leq N$, for all i .

Test Set 1

$2 \leq N \leq 1000$.

$1 \leq Q \leq 1000$.

Test Set 2

$2 \leq N \leq 10^5$ and $1 \leq Q \leq 10^5$ for at most 20 test cases.
For the remaining cases, $2 \leq N \leq 1000$ and $1 \leq Q \leq 1000$.

Sample

Sample Input

```
2
5 4
90 30 40 60
3 4
3 1
1 5
4 3
10 2
6 2 4 5 9 30 7 1 8
6 8
6 8
```

Sample Output

```
Case #1: 5 3 5 2
Case #2: 8 8
```

In sample case #1, there are four queries:

- In the first query, Bangle takes pictures in the rooms in the order 3, 2, 4, 5 and 1, so the answer is 5.
- In the second query, Bangle takes pictures in the rooms in the order 3, 2, 4, 5 and 1, so the answer is 3.
- In the third query, Bangle takes pictures in the rooms in the order 1, 2, 3, 4 and 5, so the answer is 5.
- In the fourth query, Bangle takes pictures in the rooms in the order 4, 3, 2, 5, and 1, so the answer is 2.

In sample case #2, there are two queries:

- In the first query, Bangle takes pictures in the rooms in the order 6, 5, 4, 3, 2, 1, 7, 8, 9 and 10, so the answer is 8.
- The second query is the same as the first, so the answer is also 8.