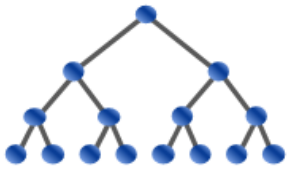

# USACO 2024 US OPEN CONTEST, BRONZE
# PROBLEM 3. FARMER JOHN'S FAVORITE PERMUTATION



**Not submitted yet**

English (en)

Farmer John has a permutation $p$ of length $N$ ($2 \leq N \leq 10^5$), containing each positive integer from 1 to $N$ exactly once. However, Farmer Nhoj has broken into FJ's barn and disassembled $p$. To not be too cruel, FN has written some hints that will help FJ reconstruct $p$. While there is more than one element remaining in $p$, FN does the following:

Let the remaining elements of $p$ be $p'_1, p'_2, \ldots, p'_n$,

- If $p'_1 > p'_n$, he writes down $p'_2$ and removes $p'_1$ from the permutation.
- Otherwise, he writes down $p'_{n-1}$ and removes $p'_n$ from the permutation.

At the end, Farmer Nhoj will have written down $N-1$ integers $h_1, h_2, \ldots, h_{N-1}$, in that order. Given $h$, Farmer John wants to enlist your help to reconstruct the lexicographically minimum $p$ consistent with Farmer Nhoj's hints, or determine that Farmer Nhoj must have made a mistake. Recall that if you are given two permutations $p$ and $p'$, $p$ is lexicographically smaller than $p'$ if $p_i < p'_i$ at the first position $i$ where the two differ.

**INPUT FORMAT (input arrives from the terminal / stdin):**

Each input consists of $T$ independent test cases ($1 \leq T \leq 10$). Each test case is described as follows:

The first line contains $N$.

The second line contains $N-1$ integers $h_1, h_2, \ldots, h_{N-1}$ ($1 \leq h_i \leq N$).

**OUTPUT FORMAT (print output to the terminal / stdout):**

Output $T$ lines, one for each test case.

If there is a permutation $p$ of $1 \ldots N$ consistent with $h$, output the lexicographically smallest such $p$. If no such $p$ exists, output $-1$.

**SAMPLE INPUT:**

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

**SAMPLE OUTPUT:**

```
1 2
-1
-1
3 1 2 4
1 2 3 4
```

For the fourth test case, if $p = [3, 1, 2, 4]$ then FN will have written down $h = [2, 1, 1]$.

```
p' = [3,1,2,4]
p_1' < p_n' -> h_1 = 2
p' = [3,1,2]
p_1' > p_n' -> h_2 = 1
p' = [1,2]
p_1' < p_n' -> h_3 = 1
p' = [1]
```

Note that the permutation $p = [4, 2, 1, 3]$ would also produce the same $h$, but $[3, 1, 2, 4]$ is lexiocgraphically smaller.

For the second test case, there is no $p$ consistent with $h$; both $p = [1, 2]$ and $p = [2, 1]$ would produce $h = [1]$, not $h = [2]$.

**SCORING:**

- Input 2: $N \leq 8$
- Inputs 3-6: $N \leq 100$
- Inputs 7-11: No additional constraints.

Problem credits: Chongtian Ma

**Language:** C

**Source File:** Choose File No file chosen

Submit Solution