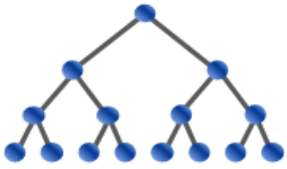

USACO 2024 JANUARY CONTEST, SILVER
PROBLEM 1. COWMPETENCY

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Contest has ended.

English (en)

Farmer John is hiring a new herd leader for his cows. To that end, he has interviewed N ($2 \leq N \leq 10^5$) cows for the position. After interviewing the ith candidate, he assigned the candidate an integer "cowmpetency" score c_i ranging from 1 to C inclusive ($1 \leq C \leq 10^9$) that is correlated with their leadership abilities.

Because he has interviewed so many cows, Farmer John does not remember all of their cowmpetency scores. However, he does remembers Q ($1 \leq Q < N$) pairs of numbers (a_j, h_j) where cow h_j was the first cow with a **strictly greater** cowmpetency score than cows 1 through a_j (so $1 \leq a_j < h_j \leq N$).

Farmer John now tells you the sequence $c_1, \ldots, c_N$ (where $c_i = 0$ means that he has forgotten cow i's cowmpetency score) and the Q pairs of (a_j, h_j). Help him determine the **lexicographically smallest** sequence of cowmpetency scores consistent with this information, or that no such sequence exists! A sequence of scores is lexicographically smaller than another sequence of scores if it assigns a smaller score to the first cow at which the two sequences differ.

Each input contains T ($1 \leq T \leq 20$) independent test cases. The sum of N across all test cases is guaranteed to not exceed $3 \cdot 10^5$.

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

The first line contains T, the number of independent test cases. Each test case is described as follows:

1. First, a line containing N, Q, and C.
2. Next, a line containing the sequence $c_1, \ldots, c_N$ ($0 \leq c_i \leq C$).
3. Finally, Q lines each containing a pair (a_j, h_j). It is guaranteed that all a_j within a test case are distinct.

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

For each test case, output a single line containing the lexicographically smallest sequence of cowmpetency scores consistent with what Farmer John remembers, or -1 if such a sequence does not exist.

SAMPLE INPUT:

```
1
7 3 5
1 0 2 3 0 4 0
1 2
3 4
4 5
```

SAMPLE OUTPUT:

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

We can see that the given output satisfies all of Farmer John's remembered pairs.

- $\max(c_1) = 1$, $c_2 = 2$ and $1 < 2$ so the first pair is satisfied
- $\max(c_1, c_2, c_3) = 2$, $c_4 = 3$ and $2 < 3$ so the second pair is satisfied
- $\max(c_1, c_2, c_3, c_4) = 3$, $c_5 = 4$ and $3 < 4$ so the third pair is satisfied

There are several other sequences consistent with Farmer John's memory, such as

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

However, none of these are lexicographically smaller than the given output.

SAMPLE INPUT:

```
5
7 6 10
0 0 0 0 0 0 0
1 2
```

```
2 3
3 4
4 5
5 6
6 7
8 4 9
0 0 0 0 1 6 0 6
1 3
6 7
4 7
2 3
2 1 1
0 0
1 2
10 4 10
1 2 0 2 1 5 8 6 0 3
4 7
1 2
5 7
3 7
10 2 8
1 0 0 0 0 5 7 0 0 0
4 6
6 9
```

SAMPLE OUTPUT:

```
1 2 3 4 5 6 7
1 1 2 6 1 6 7 6
-1
1 2 5 2 1 5 8 6 1 3
-1
```

In test case 3, since $C = 1$, the only potential sequence is

```
1 1
```

However, in this case, cow 2 does not have a greater score than cow 1, so we cannot satisfy the condition.

In test case 5, a_1 and h_1 tell us that cow 6 is the first cow to have a strictly greater score than cows 1 through 4. Therefore, the largest score for cows 1 through 6 is that of cow 6: 5. Since cow 7 has a score of 7, cow 7 is the first cow to have a greater score than cows 1 through 6. So, the second statement that cow 9 is the first cow to have a greater score than cows 1 through 6 cannot be true.

SCORING:

- Input 3 satisfies $N \leq 10$ and $Q, C \leq 4$.
- Inputs 4-8 satisfy $N \leq 1000$.
- Inputs 9-12 satisfy no additional constraints.

Problem credits: Suhas Nagar

Contest has ended. No further submissions allowed.