Cheap Construction

Input file: standard input
Output file: standard output
Time limit: 3 seconds
Memory limit: 256 megabytes

Blackwater Industries plans on building a space colony in the forest moon of Alpha Centauri A called Pandora, and has hired you for help.

The colony will consist of n domes, each with a positive height. The n domes will be in a single sequence, and we label the positions 1 to n from left to right. Using the latest advances in wormhole technology, it is possible to insert a new dome between any two existing domes, even if there isn't any space available between them! Of course, it is also possible to insert a new dome before the first dome, or after the last dome.

The space colony will be built in n steps starting from an empty sequence. The ith step is described by two integers (p_i, h_i) and it means:

- Insert a new dome with height h_i, so that the newly-inserted dome lands at position p_i after insertion.

More formally, right before the ith step, there will be exactly $i - 1$ domes in the sequence, and the ith operation (p_i, h_i) must satisfy $1 \leq p_i \leq i$. Then the meaning of the ith operation is:

- If $p_i = 1$, then insert a new dome of height h_i before all currently-existing domes.
- If $p_i = i$, then insert a new dome of height h_i after all currently-existing domes.
- If $1 < p_i < i$, then insert a new dome of height h_i between the domes at locations p_{i-1} and p_i.

Thus, right after the ith step, there will be exactly i domes in the sequence.

Now, for a sequence $S = [p_1, h_1, p_2, h_2, \ldots, p_n, h_n]$ of $2n$ numbers, define $C(S)$ be the sequence of heights of the domes after performing the sequence of operations $(p_1, h_1), (p_2, h_2), \ldots, (p_n, h_n)$. Thus, $C(S)$ is a sequence of n numbers.

Blackwater Industries has drafted an initial plan. Their goal is to build a space colony whose dome heights are equal to $C(P)$, where P is a sequence of $2n$ numbers given as input. However, they're cheap, so they want to build the same space colony but with a lower **cost**!

In the age of space travel, cost is measured differently. For two given sequences P and Q of length $2n$, the sequence with lower cost is the one that is lexicographically smaller.

What is the cheapest Q which produces the same space colony as P? In other words, what is the lexicographically smallest sequence Q of $2n$ numbers such that $C(P) = C(Q)$?

Note: Let A of B be two distinct sequences. Then A is **lexicographically smaller** than B iff at least one of the following conditions hold:

- A is a prefix of B;
- A is not a prefix of B, and if i is the smallest index where they differ, then $A_i < B_i$.

Input

The first line of input contains a single integer t, the number of test cases. The descriptions of t test cases follow.

Each test case consists of multiple lines of input. The first line of each test case contains the integer n. Then n lines follow, where the ith line contains two space-separated integers p_i and h_i. The sequence P is now defined as $[p_1, h_1, p_2, h_2, \ldots, p_n, h_n]$.

- $1 \le t \le 1000$
- $1 \le n \le 500000$
- The sum of all n in a single test file is at most 500000
- $1 \le p_i \le i$
- $1 \le h_i \le n$

Output

For each test case, output n lines where the ith line contains two space-separated integers P_i and H_i. The sequence Q defined as $[P_1, H_1, P_2, H_2, \ldots, P_n, H_n]$ must be the lexicographically smallest sequence such that $C(P) = C(Q)$.

Example

standard input	standard output
1 3 1 1 2 2 1 3	1 1 1 3 3 2

Note

The sequence $P = [1, 1, 2, 2, 1, 3]$ in the output corresponds to the 3 operations $(1, 1), (2, 2), (1, 3)$ which produces the following sequence of heights:

- Initially, the sequence is [] (empty).
- After $(1, 1)$, the heights are $[1]$.
- After $(2, 2)$, the heights are $[1, 2]$.
- After $(1, 3)$, the heights are $[3, 1, 2]$.

Thus, $C(P) = [3, 1, 2]$.

The sequence $Q = [1, 1, 1, 3, 3, 2]$ in the output corresponds to the 3 operations $(1, 1), (1, 3), (3, 2)$ which produces the following sequence of heights:

- Initially, the sequence is [] (empty).
- After $(1, 1)$, the heights are $[1]$.
- After $(1, 3)$, the heights are $[3, 1]$.
- After $(3, 2)$, the heights are $[3, 1, 2]$.

Thus, $C(Q) = [3, 1, 2]$, and we have $C(P) = C(Q)$. Furthermore, one can show that $[1, 1, 1, 3, 3, 2]$ is the lexicographically smallest such sequence.