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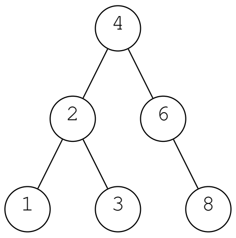
Datenstrukturen & Algorithmen Programming Exercise 5 FS 13

In this exercise we are going to implement two operations for binary search trees.

The operation `Insert` works recursively: Inserting an element into an empty tree results in a tree whose root is the element itself. To insert the element k into a non-empty tree, we compare the key of the root with k. If k is smaller or equal, we continue recursively on the subtree rooted at the left child. Otherwise, we continue recursively on the subtree rooted at the right child. Note that if the two keys are equal, the element is inserted in the left subtree. The insertion sequence $4, 2, 1, 6, 3, 8$ results in the following binary search tree.



The operation `Visit` performs a post-order traversal of the tree (we first visit the left subtree, then the right subtree and finally the root). For the above tree, the vertices are considered in the order $1, 3, 2, 8, 6, 4$. For each vertex that is visited, we print the key stored in that vertex and the depths of the left and the right subtree of the vertex (in exactly this order).

Input The first line contains only the number t of test instances. After that, we have exactly one line per test instance containing the numbers $n, k_1, ..., k_n$. While $n \in \mathbb{N}$, $1 \le n \le 1000$, describes the number of following integers, $k_i \in \mathbb{Z}$, $-10^8 \le k_i \le 10^8$ is the i-th key to be inserted into the binary search tree.

Output For every test instance we output only one line. It contains the result of the `Visit` operation *after* every element of the corresponding sequence has been inserted into the binary search tree.

Example

Input:

```
2
5 1 2 3 4 5
7 7 3 5 1 9 8 11
```

Output:

```
5 0 0 4 0 1 3 0 2 2 0 3 1 0 4
1 0 0 5 0 0 3 1 1 8 0 0 11 0 0 9 1 1 7 2 2
```

Hand-in: until Wednesday, 27th March 2013.