BST Delete

Your task is to implement bstDelete method for **Binary Search Tree** data structure. To create and display BST you can use the functions given in the file or your functions from previous classes. Your implementation have to support only one operation: `DELETE X`, which searches for the node, swaps its value with the smallest value in its right subtree and deletes the node.

Input

The first line contains integer z ($1 \leqslant z \leqslant 2 \cdot 10^9$) – the number of data sets. Each data set is as follows:

The first line contains a number n ($1 \leqslant n \leqslant 4000000$) – the number of the operations performed on bstTree. Each of the next n lines contains an instruction (with an argument if applied) to be performed on `bstTree`.

Output

Each instruction should produce the following output:

- `INSERT x` outputs 1 if x is added succesfully to `bstTree`, 0 otherwise;
- `SEARCH X` outputs 1 if x is in `bstTree`, 0 otherwise;
- `PREORDER, INORDER, POSTORDER` output the keys of `bstTree` sorted by **preorder, inorder, postorder** rule, respectively.
- `DELETE X` outputs 1 if value can be deleted from the tree, 0 otherwise;

Example

For the input:

```
1
15
INSERT 7
INSERT 4
INSERT 2
INSERT 5
INSERT 12
INSERT 11
INSERT 9
INSERT 8
INSERT 10
INSERT 13
DELETE 10
DELETE 7
INORDER
POSTORDER
PREORDER
```

the output is:

```
1
1
1
1
1
1
1
1
1
1
1
1
2 4 5 8 9 11 12 13
2 5 4 9 11 13 12 8
8 4 2 5 12 11 9 13
```