HW3

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助教

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Announcements

- 若程式使用到不開放的library則該題算0分
- 作業成績將以時限內OJ上最後一次上傳的結果計算
- 繳交到 Moodle 上的程式碼**必須**要和最後一次上傳 OJ 的程式碼相同

HW3-1: Red-Black Tree(4pts)

Red-Black Tree

Description

Since 瓦基 was too busy running from 魯拉拉 that he didn't write the stories, there won't be stories for HW3. He is very sorry for that.

Please implement a red black tree that support the insert and print operation.

Input

Each test case contains one red-black tree only. The test case contains M lines of following commands.

1. I: The insertion command. The command is followed by an integer $input$, the desired number to be inserted into thered-black tree. Please insert$input$into thered-black tree.
2. P: The print command. Please print thered-black treein the format root(left_child_node())(right_child_node()) and print a node in the format value_color(). Please see the sample I/O for reference.

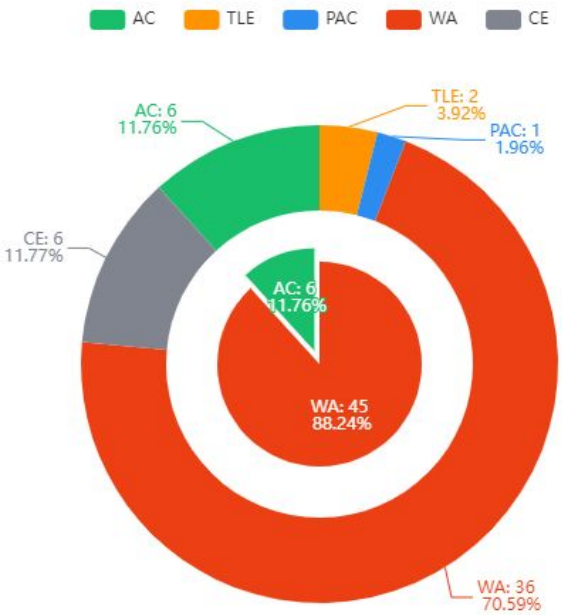
Please note that the number of M will not be given, so the program should stop automatically upon EOF is read.

Output

Please print the results of the corresponding command line by line.

HW3-1: Red-Black Tree(4pts)

- (**1pts**) $1 \le M \le 20$
- (**1pts**) $1 \le M \le 100$
- (**1pts**) $1 \le M \le 500$
- (**1pts**) $1 \le M \le 10000$



HW3-2: Search in permuted sequence(4pts)

Search in permuted sequence

Description

There is a non-repeating sequence in ascending order, which is later permuted with an index k. That is, $[s[k], s[k+1], ...s[n-1], s[0], s[1], ..., s[k-1]]$.

For example, sequence `[0,1,2,4,5,6,7]` can be permuted with index `3` and then become `[4,5,6,7,0,1,2]`.

Given a sequence after the permutation, `S`, and an integer, `target`, please return the index of `target` if `target` is in `S`. Otherwise, return `-1`.

Input

The first line of each test case contains an integer `N`, the length of the sequence `S`.

The second line contains `N` integers, the elements of sequence `S` after permutation.

The third line contains an integer `M`, the number of queries.

The next `M` lines are queries, each of which contains an integer `target`. Please output the index for each `target` in `S` or `-1` if the `target` is not found in `S`.

Output

Print the index of target in the sequence.

HW3-2: Search in permuted sequence(4pts)

- (**1pts**) $1 \le N \le 100$, $1 \le M \le 10$
- (**1pts**) $1 \le N \le 10000$, $1 \le M \le 1000$
- (**2pts**) $1 \le N \le 500000$, $1 \le M \le 10000$
  - HINT: Try to apply Bineary Search