

## Assignment on Red Black Tree

A super-computer named TEUB has many running processes. Each process has a priority  $x$ . Two active processes in TEUB cannot have equal priorities. When a process finishes its task, it gets terminated. Sometimes, the programmers of TEUB want to know how many running processes have priorities less than  $y$ . The programmers hired you to help them using Red-Black tree.

The input has four types of commands.

- Initiation of a program
- Termination of a program
- Searching for a program
- Find the programs with less priority

### Input

First line of input shows the total number of commands (N).

Each of the following N commands, has two integers  $e_i$  and  $x_i$ .

$e_i$	Meaning
0	Terminate the program with priority $x_i$ .
1	Initiate a program with priority $x_i$ .
2	Search the program with priority $x_i$ .
3	Find the number of programs with priority less than $x_i$ .

### Output

First line of input shows the number of output lines.

For each command, you have to print three integers  $e_i$ ,  $x_i$  and  $r_i$ .

$r_i$  signifies the result of the corresponding command.

$e_i$	$r_i$
0	1 if successful termination. 0 if there is no program with priority $x_i$
1	1 if successful initiation 0 if there is already a program with priority $x_i$
2	1 if found 0 if not found

3	The number of programs with priority $< x_i$ .
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### Sample I/O

Sample Input	Sample Output	Explanation
1 1	1 1	Line count
1 1	1 1 1	Successful initiation 1
1 2	1 2 1	Successful initiation 2
1 3	1 3 1	Successful initiation 3
1 1	1 1 0	Same priority (1) exists
0 1	0 1 1	Successful termination 1
0 4	0 4 0	No priority (4) exists
2 3	2 3 1	Priority 3 found
2 5	2 5 0	Priority 5 not found
1 1	1 1 1	Successful initiation 1
3 3	3 3 2	2 programs having priority $< 3$
3 6	3 6 3	3 programs having priority $< 6$

### Constraints

$$1 \leq N \leq 10^5$$

$$1 \leq x_i \leq 10^6$$

$$0 \leq e_i \leq 3$$

Each of the commands has to be answered in logarithmic time.

### More instructions

- Write the program in such a way to accept input from file
- Write Red-Black tree codes in such a way that it can be reused for other tasks during online evaluation.

### Submission

- Include only source files
- Do not include executable binaries, input/output files
- Place your files in a folder named 1905XXX
- Zip the folder
- Submit to Moodle after renaming it to 1905XXX.zip