Feedback — Balanced Search Trees

Help Center

You submitted this quiz on **Tue 6 Oct 2015 11:55 PM EDT**. You got a score of **0.60** out of **3.00**. You can attempt again, if you'd like.

```
To specify an array or sequence of values in an answer, separate the value
s in
the sequence by whitespace. For example, if the question asks for the firs
t
ten powers of two (starting at 1), then the following answer is acceptabl
e:

     1 2 4 8 16 32 64 128 256 512

If you wish to discuss a particular question and answer in the forums, ple
ase
post the entire question and answer, including the seed (which can be used
by
the course staff to uniquely identify the question) and the explanation (w
hich
contains the correct answer).
```

Question 1

```
(seed = 71708)
Consider the left-leaning red-black BST whose level-order traversal is:

    65 57 79 29 64 71 87 23 53 61 66 72 18

List (in ascending order) the keys in the red nodes. A node is red if the l
ink
from its parent is red. Your answer should be a sequence of integers, separ
ated
by whitespace.
```

You entered:

18 23 29 57 66 71

Your Answer		Score	Explanation
18 23 29 57 66 71	✖	0.00	
Total		0.00 / 1.00	

Question Explanation

```
The correct answer is: 18 29 61 71

The shape of a BST is uniquely determined by its level-order traversal.

To deduce which links are red, recall that the length of every path from t
he root to a
null link has the same number of black links; apply this property starting
from nodes
at the bottom.
```

Question 2

```
(seed = 576986)
Consider the left-leaning red-black BST whose level-order traversal is

    66 55 80 23 56 71 88 70 79 67          ( red links = 67 71 )

What is the level-order traversal of the red-black BST that results after
inserting the following sequence of keys:

    72 34 68

Your answer should be a sequence of 13 integers, separated by whitespace.
```

You entered:

66 23 55 80 34 56 70 71 88 68 72 79

Your Answer		Score	Explanation
66 23 55 80 34 56 70 71 88 68 72 79	✖	0.00	
Total		0.00 / 1.00	

Question Explanation

```
The correct answer is: 71 66 80 55 68 79 88 34 56 67 70 72 23

Here is the level-order traversal of the red-black BST after each insertio
n:

    66 55 80 23 56 71 88 70 79 67          ( red links = 67 71 )
72: 66 55 80 23 56 71 88 70 79 67 72       ( red links = 67 71 72 )
34: 66 55 80 34 56 71 88 23 70 79 67 72    ( red links = 23 67 71 72 )
68: 71 66 80 55 68 79 88 34 56 67 70 72 23 ( red links = 23 66 72 )
```

Question 3

```
(seed = 764622)
Which of the following statements about balanced search trees are true? Che
ck all that apply. Unless otherwise specified, assume that the 2-3 tree and
red-black BSTs are as described in lecture (e.g., 2-3 trees are perfectly b
alanced and red-black BST are left-leaning red-black BSTs with internal lin
ks colored either red or black).
```

Your Answer		Score	Explanation
☑ The height of a red-black BST on N nodes is less	✖	0.00	The height can be as large as 2 lg N.

than or equal to 2 log_3 N.			
☑ The subtree rooted at any node of a 2-3 tree is itself a 2-3 tree.	✔	0.20	It satisfies symmetric order and perfect balance.
☑ The maximum number of color flips triggered by inserting a key into a red-black BST on N nodes is ~ lg N.	✔	0.20	If every other link on the path from a root to a leaf is red, then the length of the path is ~ 2 lg N and there will be ~ lg N color flips.
☑ It is possible to construct a red-black BS	✔	0.20	Create a perfectly balanced BST by choosing the (upper) median key to be the root and recursively construct a perfectly balanced BST in each subtree. The resulting tree can be (uniquely) colored to make it a red-black BST. One way to see how is to color every link in the bottommost level red so that the red-black BST has perfect black balance. Note that since we use the upper median (instead of the lower median), whenever there is a right-leaning link that is red, the sibling left-leaning link will also be red. Now, repeatedly apply color flip

T from a sorted array of N distinct keys in linear time.			operations until there are no more right-leaning red links.
☐ Let x be a node in a red-black BST and let y be its right child. Then, the result of rotating x left (which makes y the parent of x) and then rotating y right (which makes x the parent of y) is the original BS	✖	0.00	Left and right rotations are inverse operations.

T.

Total	0.60 / 1.00

Question Explanation