2-1 分数 3 作者 陈越 单位 浙江大学

If there are 28 nodes in an AVL tree, then the maximum depth of the tree is ___. The depth of an empty tree is defined to be -1.

A. 3

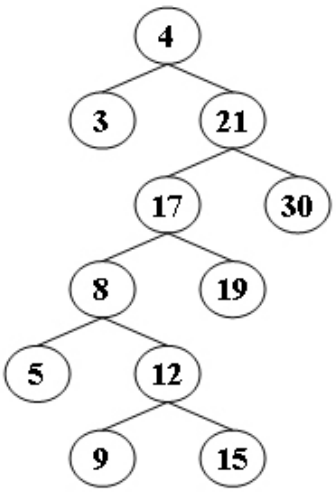
B. 4

C. 5

D. 6

2-2 分数 2 作者 陈越 单位 浙江大学

For the result of accessing 9 in the splay tree in the following figure, besides saying that 9 must be the root, which one of the following statements is also TRUE?



A. 12 is a leaf node

B. 4 and 21 are siblings

C. 8 and 21 are siblings

D. 12 and 21 are siblings

2-3 分数 2 作者 陈越 单位 浙江大学

When doing amortized analysis, which one of the following statements is FALSE?

○ A. For potential method, a good potential function should always assume its maximum at the start of the sequence

○ B. For accounting method, when an operation's amortized cost exceeds its actual cost, we save the difference as credit to pay for later operations whose amortized cost is less than their actual cost

○ C. Aggregate analysis shows that for all n, a sequence of n operations takes worst-case time $T(n)$ in total. Then the amortized cost per operation is therefore $T(n)/n$

○ D. The difference between aggregate analysis and accounting method is that the later one assumes that the amortized costs of the operations may differ from each other

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2-4 分数 3 作者 叶德仕 单位 浙江大学

In this problem, we would like to find the amortized cost of insertion in a dynamic table T. Initially the size of the table T is 1. The cost of insertion is 1 if the table is not full. When an item is inserted into a full table, the table T is expanded as a new table of size 5 times larger. Then, we copy all the elements of the old table into this new table, and insert the item in the new table.

Let $num(T)$ be the number of elements in the table T, and $size(T)$ be the total number of slots of the table. Let D_i denote the table after applying the ith operation on D_{i-1}.

Which of the following potential function $\Phi(D_i)$ can help us achieve $O(1)$ amortized cost per insertion?

○ A. $\Phi(D_i) = \frac{5}{4}(num(T) - \frac{size(T)}{5})$

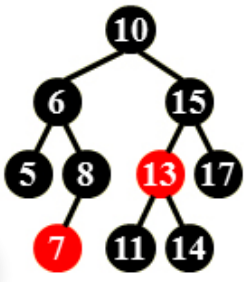
○ B. $\Phi(D_i) = \frac{5}{4}(num(T) + \frac{size(T)}{5})$

○ C. $\Phi(D_i) = num(T) - \frac{size(T)}{5}$

○ D. $\Phi(D_i) = num(T) + \frac{size(T)}{5}$

2-5 分数 3 作者 徐镜春 单位 浙江大学

After deleting 10 from the red-black tree given in the figure, which one of the following statements must be FALSE?



○ A. 8 is the parent of 15, and there are 2 red nodes in the tree

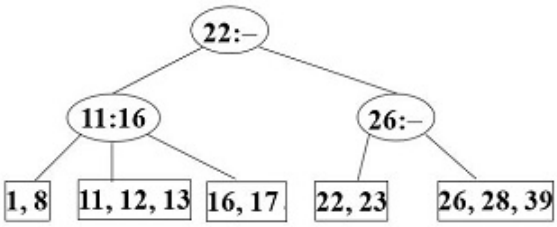
○ B. 11 is the parent of 6, and 14 is red

○ C. 8 is the parent of 15, and 7 is black

○ D. 11 is the parent of 15, and there are 2 red nodes in the tree

2-6 分数 2 作者 何钦铭 单位 浙江大学

Given a 2-3 tree as shown in the following figure. Which of the following pairs of insertions will result in a 2-3 tree with different structures?



○ A. Inserting 9 vs. inserting 24

○ B. Inserting 18 vs. inserting 24

○ C. Inserting 14 vs. inserting 18

○ D. Inserting 27 vs. inserting 30

2-7 分数 3 作者 卜佳俊 单位 浙江大学

Given a set of 10000 emails in the mailbox, our task is to retrieve the spam emails from this set. The statistic data for a spam filter's performance are shown in the following table. The recall of this filter is: ___.

Category	Actual True Spam	Actual False Spam
Retrieved True Spam	2000	1000
Retrieved False Spam	2000	5000

○ A. 33.3%

○ B. 66.7%

○ C. 50.0%

○ D. 28.6%

2-8 分数 2 作者 陈越 单位 浙江大学

Which one of the following statements is FALSE about a skew heap?

○ A. Skew heaps do not need to maintain the null path length of any node

○ B. Comparing to leftist heaps, skew heaps are always more efficient in space

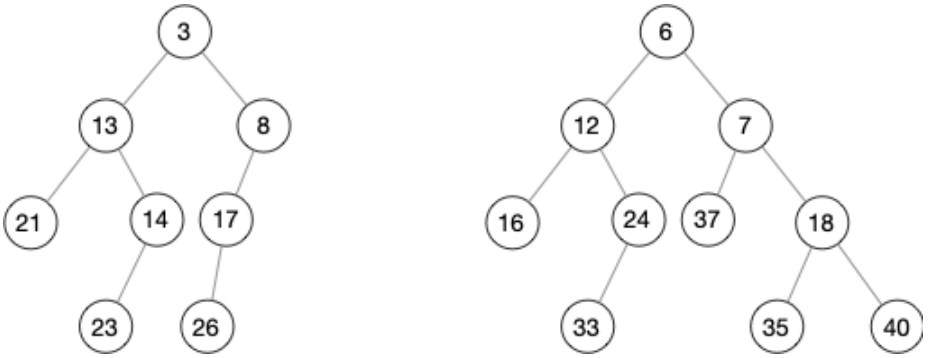
○ C. Skew heaps have $O(logN)$ worst-case cost for merging

○ D. Skew heaps have $O(logN)$ amortized cost per operation

2-9　分数 3　　作者 卜佳俊　　单位 浙江大学

Merge the two skew heaps in the following figure. How many of the following statements is/are FALSE?

- the null path length of 8 is the same as that of 6
- 35 is the right child of 18
- the depths of 18 and 33 are the same



○ A. 0

○ B. 1

○ C. 2

○ D. 3