Amortized bounds are weaker than the corresponding worst-case bounds, because there is no guarantee for any single operation.

T F

答案正确：1 分 创建提问

If a data structure supports an operation QI such that a sequence of n QI's takes $\Theta(n^2 \log n)$ time to perform in the worst case, then the amortized cost of a QI operation is $\Theta(n \log n)$, while the actual time of a single QI operation could be as high as $\Theta(n^2 \log n)$.

T F

答案正确：2 分 创建提问

Which one of the following statements is FALSE?

A. For red-black trees, the total cost of rebalancing for m consecutive insertions in a tree of n nodes is $O(n+m)$.

B. To obtain $O(1)$ armortized time for the function **decrease-key**, the potential function used for Fibonacci heaps is $\Phi(H) = t(H) + m(H)$, where $t(H)$ is the number of trees in the root list of heap H, and $m(H)$ is the number of marked nodes in H.

C. Let $S(x)$ be the number of descendants of x (x included). If the potential function used for splay tree is $\Phi(T) = \sum_{x \in T} \log S(x)$, then the amortized cost of one splay operation is $O(\log n)$.

D. In the potential method, the amortized cost of an operation is equal to the actual cost plus the increase in potential due to this operation.

答案正确：3 分 创建提问

If there are 14 nodes in an AVL tree, then the maximum depth of the tree is ___. The depth of an empty tree is defined to be 0.

A. 3

B. 4

C. 5

D. 6

答案正确：3 分 创建提问

Among the following 6 statements about AVL trees and splay trees, how many of them are correct?

(1) AVL tree is a kind of height balanced tree. In a legal AVL tree, each node's balance factor can only be 0 or 1.

(2) Define a single-node tree's height to be 1. For an AVL tree of height h, there are at most $2^h - 1$ nodes.

(3) Since AVL tree is strictly balanced, if the balance factor of any node changes, this node must be rotated.

(4) In a splay tree, if we only have to find a node without any more operation, it is acceptable that we don't push it to root and hence reduce the operation cost. Otherwise, we must push this node to the root position.

(5) In a splay tree, for any non-root node X, its parent P and grandparent G (guranteed to exist), the correct operation to splay X to G is to rotate X upward twice.

(6) Splaying roughly halves the depth of most nodes on the access path.

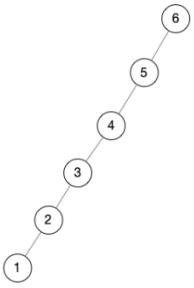
A. 2 B. 3 C. 4 D. 5

答案正确：3 分 创建提问

For the result of accessing the keys 1 and 2 in order in the splay tree in the following figure, let's define $\mathbf{size}(v) = \text{number of nodes in subtree of } v$ (v included) and potential $\phi = \sum_v \lfloor \log_2 \mathbf{size}(v) \rfloor$, where $\lfloor x \rfloor$ means the greatest interger no larger than x.

How many of the following statements is/are TRUE?

- the potential change from the **initial** tree to the **resulted** tree is -4
- 1 is the sibling of 4
- 5 is the child of 6

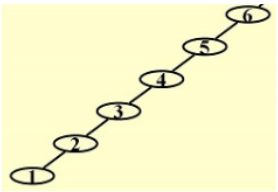


A. 0

B. 1

C. 2

After splaying at node 2 in the given tree, which of the following statements about the resulting tree is FALSE?



A. the depth of the tree is 4 (where the depth of the root is 1)

B. node 5 is a child of node 2

C. the degree of node 5 is 2

D. node 3 is a leaf node

答案正确：2 分 创建提问

Insert 28, 23, 54, 61, 98, 37 into an initially empty AVL tree first. Then immediately insert one of the following keys. Which one will cause an RL rotation?

A. 10

B. 30

C. 60

D. 70

答案正确：2 分 创建提问