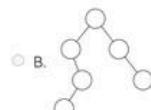
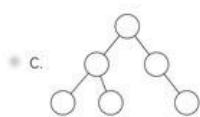
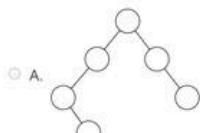
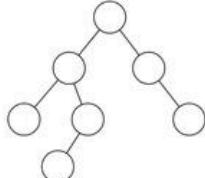


Which one below is correct about a binary search tree?

- A. All the others are wrong.
- B. Walk from the root to a leaf by following the LEFT pointer, you could get a sequence 1 2 3 4 5.
- C. The node sequence from left to right at a same level could be 1 4 3 2 5.
- D. Walk from the root to a leaf by following the RIGHT pointer, you could get a sequence 5 4 3 2 1.

答案正确: 3 分

Given a BST as shown below, which one could be the result of deleting the root node?



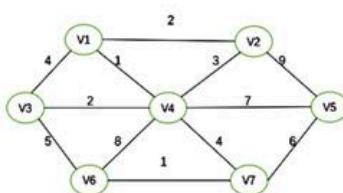
答案正确: 3 分

Which of the following is **incorrect** with respect to binary trees?

- A. Let  $T$  be a binary tree with  $\lambda$  levels. Then  $T$  has no more than  $2^\lambda - 1$  nodes.
- B. Let  $T$  be a binary tree. For every  $k \geq 0$ , there are no more than  $2^k$  nodes in level  $k$ .
- C. Let  $T$  be a binary tree with  $N$  nodes. Then the number of levels is at least  $\lceil \log_2(N+1) \rceil$
- D. In a full binary tree, if there are  $N$  leaves, then the total number of nodes is  $2N-1$ .

答案错误: 0 分

Given an undirected weighted graph as shown below, its minimum spanning tree is to grow by Prim's algorithm or Kruskal's algorithm with greedy strategies. Which of the following sequence of edges could not be selected by either algorithms?



- A. (V1,V4),(V6,V7),(V1,V2),(V3,V4),(V4,V7),(V5,V7)
- B. (V6,V7),(V4,V7),(V1,V4),(V3,V4),(V1,V2),(V5,V7)
- C. (V6,V7),(V5,V7),(V4,V7),(V1,V4),(V1,V2),(V3,V4)
- D. (V1,V4),(V1,V2),(V3,V4),(V4,V7),(V6,V7),(V5,V7)

答案正确: 3 分

R2-5 分数 3

作者 杨子祺 单位 浙江大学

Which of the following arrays does not represent a max heap? In other words, which of these arrays is not heap ordered?

- A. JIHGFEDCBA
- B. XVUSQHGJMP
- C. YSNHGFDEIC
- D. AAAAAAAAAA

浙江大学2022-2023学年秋冬学期《数据结构基础》课程期末考试试卷

题目列表

提交列表

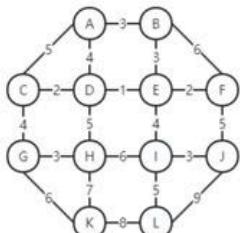
排名

讨论区



R2-6 分数 3

作者 郑友怡 单位 浙江大学



Apply Dijkstra's Algorithm from vertex S = {A}. Which of the following statement is false?

- A. The shortest path from A to L is 15
- B. The 4<sup>th</sup> vertex added to the S is E
- C. The cost of the shortest path from A -> G, A->H, and A->I is the same
- D. There is exactly one shortest path from A to F

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R2-7 分数 3

作者 朱建科 单位 浙江大学

Suppose that an array of size  $m$  is used to store a circular queue. If the front position is  $f$  and the current size is  $n$ , then the rear element must be at:

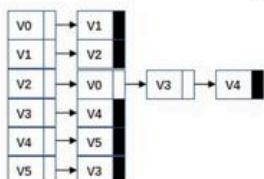
- A.  $(f + n)\%m$
- B.  $f + n$
- C.  $(f + n - 1)\%m$
- D.  $f + n - 1$

答案正确：3分

R2-8 分数 3

作者 陈越 单位 浙江大学

Given the adjacency list of a directed graph as shown by the figure. There is(are) \_\_\_\_ strongly connected component(s).



- A. 1  $\{0, 1, 2, 3, 4, 5\}$
- B. 2  $\{\{0, 1, 2\}, \{3, 4, 5\}\}$
- C. 3  $\{\{0, 1\}, \{2, 3\}, \{4, 5\}\}$
- D. 3  $\{\{0, 1, 2\}, \{2, 3, 4\}, \{3, 4, 5\}\}$

答案正确：3分

R2-9 分数 3

作者 何钦铭 单位 浙江大学

An inversion in an array  $A[]$  is any ordered pair  $(i, j)$  having the property that  $i < j$  but  $A[i] > A[j]$ . When an array  $A[]$  has very few inversions, the best algorithm to sort it is \_\_\_\_.

- A. Quick sort
- B. Merge sort
- C. Insertion sort
- D. Bubble sort

答案正确：3分

R2-10 分数 3

作者 何钦铭 单位 浙江大学

One of the following 3 algorithms, namely Bubble sort, Shell sort and Insertion sort, is applied to sort the sequence (12, 22, 26, 88, 11, 15, 20) in ascending order. The resulting sequences of the first two runs are (12, 22, 26, 11, 15, 20, 88) and (12, 22, 11, 15, 20, 26, 88), respectively. Then the algorithm must be \_\_\_\_.

- A. Shell sorting
- B. Bubble sorting
- C. Cannot be determined
- D. Insertion sorting

答案正确：3分

R2-11 分数 3

作者 杨子祺 单位 浙江大学

What is the minimum number of comparisons between heap elements required to construct a max heap of 5 elements using the  $O(n)$  BuildHeap(array)?

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

答案正确：3分

R2-12 分数 3

作者 冯雁 单位 浙江大学

Given a hash table of size 11 (indexed from 0 to 10) with the hash function  $H(Key) = Key \% 11$ . Separate chaining is used to resolve collisions. Then after inserting {1,14,12,23,25,15} one by one into the initially empty hash table, which one of the following statements is true?

- A. The key 14 is at position 2.
- B. A total of 3 collisions occurred during insertion.
- C. The identifier density is about 0.462.
- D. The average search time is greater than 2.

答案正确：3分

R2-13 分数 3

作者 何钦铭 单位 浙江大学

When Least Significant Digit (LSD) radix sort is applied to sort the sequence (145, 39, 121, 91, 93, 321, 455, 52, 10, 6) in ascending order. After the first run, which number is listed before 321\_\_\_\_\_.

- A. 91
- B. 121
- C. 10
- D. 145

答案正确：3分

R2-14 分数 3

作者 朱建科 单位 浙江大学

Given a three-dimensional array A of size  $N \times N \times N$ . The time complexity of finding the smallest element without changing the array is \_\_\_\_?

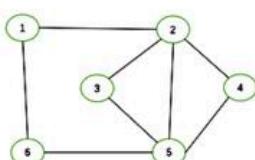
- A.  $O(N^2)$
- B.  $O(N^3)$
- C.  $O(\log N)$
- D.  $O(N \log N)$

答案正确：3分

R2-15 分数 3

作者 干红华 单位 浙江大学

The following graph has Euler circuits. If the depth-first search is used to find an Euler circuit by concatenating paths, which sequence of the following is incorrect?



- A. 1,2,3,5,2,4,5,1
- B. 5,3,5,4,2,5,6,1,5
- C. 2,1,6,5,3,2,4,5,2
- D. 3,2,1,6,5,4,2,5,3

答案正确：3分

Given a set S of 25 distinct elements and 5 distinct equivalence relations, then there must be \_\_\_\_ equivalence classes.

- A. exactly 20
- B. at least 20
- C. exactly 5
- D. at least 5

答案错误: 0 分

Given a tree of degree 3, if there are 200 nodes of degree 2, and 100 nodes of degree 3, then how many leaf nodes are there?

- A. 201
- B. Cannot be determined
- C. 301
- D. 401

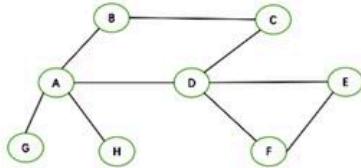
答案正确: 3 分

Given the preorder traversal sequence of a binary search tree as { 25, 15, 10, 4, 12, 22, 18, 24, 50, 35, 31, 44, 70, 66, 90 }. Which of the following statements is false?

- A. Total sum of node values of tree with root 15(inclusive) is 105
- B. 12 is a node in the subtree with root 50
- C. 50 is ancestor of 44
- D. 4 comes two nodes before 18 in the post order traversal

答案正确: 3 分

Given an undirected connected graph as shown below, the DFS traversal algorithm starting at A generates a spanning tree, which helps to find all articulation points. Which statement of the following is correct?



- A. A is an articulation point because A is the root of the spanning tree and has more than two children
- B. G is an articulation point because G is a leaf
- C. B is an articulation point because there is an edge between A and B
- D. E is an articulation point because E forms a cycle with D and F

答案正确: 3 分

Which one of the following statements about rehashing is false?

- A. The newly built table is about twice as big as the previous one.
- B. The running time of rehashing option is  $O(N)$  where  $N$  is the number of elements in the table.
- C. Rehashing is definitely necessary when an insertion fails.
- D. There is no need to use a new hash function when performing rehashing operation.

答案正确: 3 分