四川大学期末考试试题（闭卷）

（2014~2015 学年第 1 学期）

课程号：311076040 课程名称：数据结构与算法（B 卷） 任课教师：_____

适用专业年级：软件工程 2012 级 学号：_____ 姓名：_____

考试须知

四川大学学生参加由学校组织或由学校承办的各级各类考试，必须严格执行《四川大学考试工作管理办法》和《四川大学考场规则》。有考试违纪作弊行为的，一律按照《四川大学学生考试违纪作弊处罚条例》进行处理。

四川大学各级各类考试的监考人员，必须严格执行《四川大学考试工作管理办法》、《四川大学考场规则》和《四川大学监考人员职责》。有违反学校有关规定的，严格按照《四川大学教学事故认定及处理办法》进行处理。

题　　号	一(30%)	二(16%)	三(34%)	四(20%)	卷面成绩
得　　分					
阅卷时间					

注意事项：1. 请务必将本人所在学院、姓名、学号、任课教师姓名等信息准确填写在试题纸和添卷纸上；

2. **请将答案全部填写在答题纸上；**

3. 考试结束，请将试题纸、添卷纸和草稿纸一并交给监考老师。

评阅教师	得分

一、单项选择题（本大题共 15 小题，每小题 2 分，共 30 分）

提示：在每小题列出的四个备选项中只有一个是符合题目要求的，请将其代码填写在下表中。错选、多选或未选均无分。

1. Which has the highest growth rate in the following terms? (　　)

A. log 3n　　B. 2^n　　C. $2n^3 + 3n^2$　　D. n+10

2. Suppose that a client performs an intermixed sequence of (stack) *push* and *pop* operations. The push operations push the integers 0 through 9 in order on to the stack; the pop operations print out the return value. Which sequence could *not* occur? (　　)

A. 4 3 2 1 0 9 8 7 6 5　　B. 2 1 4 3 6 5 8 7 9 0

C. 0 4 6 5 3 8 1 7 2 9　　D. 4 6 8 7 5 3 2 9 1 0

3. In order to prevent pseudo-overflow we should (　　).

A. Define enough storage space

B. Dequeue as soon as possible

C. Enqueue as soon as possible

D. Use circular queue

4. Which of the following statement is false? (　　)

A. Arrays are dense lists and static data structure

B. data elements in linked list need not be stored in adjacent space in memory

C. pointers store the next data element of a list

D. linked lists are collection of the nodes that contain information part and next pointer

5. In a binary tree, if the result of traversing under postorder is the same as that under inorder, then ( )

A. It is only a binary tree with one node

B. It is either empty, or the left subtree of any node of the tree is empty

C. It is only an empty binary tree

D. It is either empty, or the right subtree of any node of the tree is empty

6. Consider the three "simple" sorting algorithms for arrays: Bubble Sort, Selection Sort, and Insertion Sort. You start with the array [3,4,7,1,2]. After three iterations of the outer loop, you have the array [1,2,3,7,4]. Which algorithm are you running? ( )

A. InsertionSort B. SelectionSort C. BubbleSort

D. All of the above produce that array after three iterations.

7. A complete Binary tree has 486 nodes, the height of this binary tree is ( )

A. 7 B. 8 C. 9 D. 10

8. The correct traversal to use on a BST to visit the nodes in sorted order is: ( )

A. Preorder traversal B. Inorder traversal C. Postorder traversal D. none of the above

9. Which of the following sorting algorithms run in speed O(n logn) in average case? ( )

A. quick, bubble, insertion B. selection, merge, radix

C. merge, quick, heap D. insertion, heap, bubble

10. Using Quicksort to sort the following four sequences, and choose the first element as the benchmark to divide. During the first division, in the following sequences which need to move the most times ( )

A. 70,75,82,90,23,16,10,68 B. 70,75,68,23,10,16,90,82

C. 82,75,70,16,10,90,68,23 D. 23,10,16,70,82,75,68,90

11. A 2-3 tree is a specific variant of a: ( )

A. Splay tree. B. -tree. C. BST. D. Trie.

12. Which of the following is not the required condition for binary search algorithm? ( )

A. The list must be sorted

B. There should be the direct access to the middle element in any sublist

C. There must be mechanism to delete and/or insert elements in list

D. None of above

13. Assume that the length of Hash table is m=9, Hash function H(key) = key % 9. There have been 4 nodes in the table, and their addresses are: 4,5,6,7. Other addresses are NULL. In virtue of linear probing re-hash to deal with conflict, calculate the address of node whose keyword is 14. ( )

A. 5 B. 6 C. 8 D. 0

14. The primary difference between a B-tree and a B+-tree is ( ).

A. The B+-tree store records only at the leaf nodes.

B. The B+-tree has a higher branching factor.

C. The B+-tree is hight balanced.

D. The B+-tree is smaller.

15. Dijkstra's algorithm requires that vertices be visited in: (　　)

A. Depth-first order.

B. Breadth-first order.

C. Order of shortest distance from the source vertex.

D. No particular order.

评阅教师	得分

二、名词解释题（本大题共 4 小题，每小题 4 分，共 16 分）。提示：解释每小题所给名词的含义，若解释正确则给分，若解释错误则无分，若解释不准确或不全面，则酌情扣分。

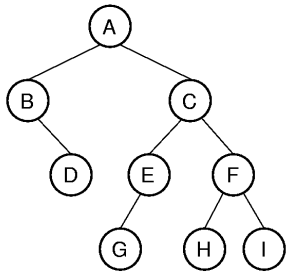
1. ADT
2. full binary tree
3. lower bound
4. load factor

评阅教师	得分

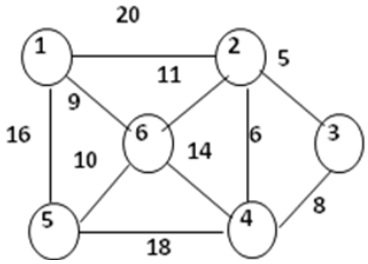
三、应用题（本大题共 4 小题，1-2 每小题 8 分，3-4 每小题 9 分，共 34 分）

提示：有求解过程的要尽量给出解题步骤，只有最终答案会酌情扣分。

1. Please show the pre-order traversal and post-order traversal results of the BT bellow.



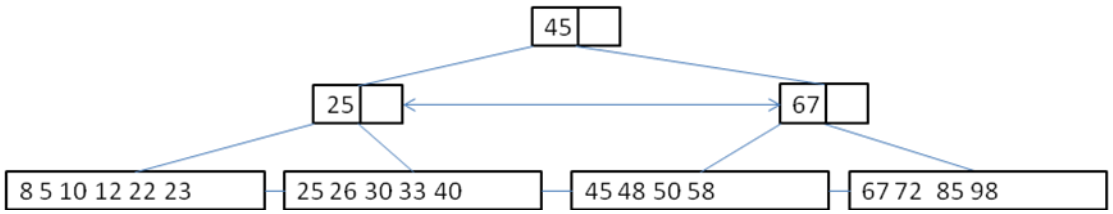
2. Given the following undirected graph,



1) List the order of the edges which are added into MST when running Prim's MST algorithm. Starting at vertex 3.

2) Show the final MST.

3. Show the process of Deleting 12 and then delete 50 from the following B+ tree of order three(m=3), the leaf nodes of the B^+ tree can store 7 records at most.



4. A 10 elements complete binary tree is represented by the array [4, 30, 89, 7, 200, 26, 130, 15, 48, 16].

1) Draw the complete binary tree. Is this complete binary tree a min heap?

2) If not, construct the min heap.

评阅教师	得分

四、编程、设计及分析题（本大题共 2 小题，1 小题 8 分，2 小题 12 分，共 20 分）。

提示：请按照要求写出源程序代码，如果源代码中出现语法或逻辑错误，则酌情扣分。

1. Write a recursive function that returns the number of non-leaf nodes in a binary tree.

2. Write an algorithm that traverses a singly linked list and deletes all nodes whose keys are negative.