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（A卷）__ 任课教师：_____

适用专业年级：__软件工程 2012 级__ 学号：_____ 姓名：_____

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. Asymptotic analysis refers to: (　　)

    (A) The cost of an algorithm in its best, worst, or average case.

    (B) The growth in cost of an algorithm as the input size grows towards infinity.

    (C) The size of a data structure.

    (D) The cost of an algorithm for small input sizes.

2. For a list of length n, the linked-list implementation's prev function requires worst-case time:(　　)

    (A) O(1)　　　(B) O(log n)　　　(C) O(n)　　　(D) O(n^2).

3. For a singly linked list with a head node pointer, The condition to determine whether it is empty is (　　)

    (A) head == NULL　　(B) head->next == NULL　　(C)head->next == head　　(D)head != NULL

4. The input of a stack is **abcde**, the output of the stack can't be (　　).

    (A) edacb　　　(B) bcdae　　　(C) bcade　　　(D) aedcb

5. If a binary tree has 13 nodes with two degrees and 6 nodes with one degree, how many nodes are there with zero degree? (　　)

    (A) 7　　(B) 15　　(C) 14　　(D) uncertain

6. Recursion is generally implemented using (　　)

    (A) A sorted list　　(B) A stack　　(C) A queue　　(D)A heap

注：试题字迹务必清晰，书写工整。

7. Which of the following is a **true** statement: (　　　)

(A) In a BST, the left child of any node is less than the right child, and in a heap, the left child of any node is less than the right child.

(B) In a BST, the left child of any node is less than the right child, but in a heap, the left child of any node could be less than or greater than the right child.

(C) In a BST, the left child of any node could be less or greater than the right child, but in a heap, the left child of any node must be less than the right child.

(D) In both a BST and a heap, the left child of any node could be either less than or greater than the right child.

8. Huffman coding provides the optimal coding when:(　　　)

(A) The messages are in English.

(B)The messages are binary numbers.

(C) Skewed so that there is a great difference in relative frequencies for various letters.

(D) none of the above

9. We use the parent pointer representation for general trees to solve which problem? (　　　)

(A) Shortest paths　　　　　　(B) General tree traversal

(C)Equivalence classes　　　(D)Exact-match query

10. When sorting n records, Quicksort has average-case cost: (　　　)

(A) O(log n).　　(B) O(n).　　(C) O(n^2)　　(D) O(n log n).

11. The basic unit of I/O when accessing a disk drive is: (　　　)

(A) A byte.　　(B) A sector.　　(C) A cluster.　　(D) A track.

12. Breadth-first search in graph is best implemented using: (　　　)

(A) A stack or recursion.　　(B) A queue.　　(C) A tree.　　(D)none of the above

13. Self-organizing lists attempt to keep the list sorted by: (　　　)

(A) Value　　　　　　　　(B) frequency of record access

(C) size of record　　　(D)None of the above

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. The goal of a topological sort is to: (　　　)

(A)Sort all of the graph vertices by value.

(B)Sort all of the graph vertices so that each vertex is listed prior to any others that depend on it.

(C)Sort all of the graph vertices by distance from the source vertex.

(D)None of the above.

注：试题字迹务必清晰，书写工整。　　　　　　　　　本题共 **4** 页，本页为第 **2** 页

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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. growth rate

2. priority queue

3. external sorting

4. connected component

评阅教师	得分

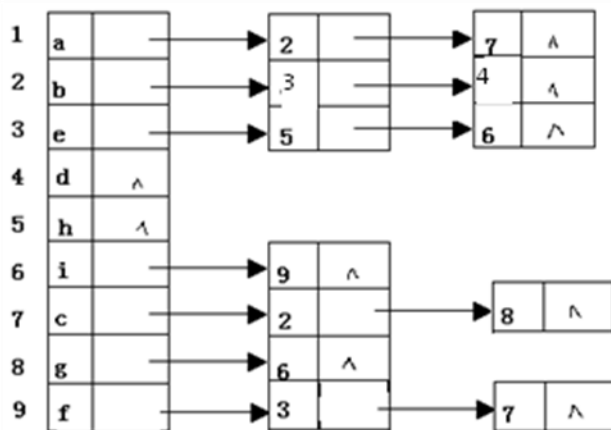**三、应用题（本大题共 4 小题，1-2 每小题 8 分，3-4 每小题 9 分，共 34 分）**

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 In-order traversal results of the BT bellow.
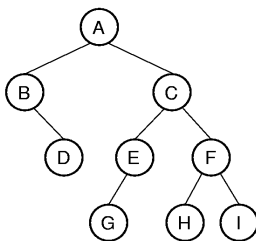
2. Given the Adjacency List representation of a directed graph as following,

   1) Draw the graph.

   2) Show the Adjacency Matrix representation of the graph.

3. Please show the process of constructing a 2-3 tree by inserting the records in following order: 8, 85, 23, 45, 58, 67, 40, 30, 26, 5, 72, 98.

4. Assume that you have a twelve-slot closed hash table (the slots are indexed 0 through 11).

   1) Show the final hash table that would result if you used the hash function $H(k) = k \bmod 12$ and the simple linear probing $P(K,i) = i$ on this list of numbers: 2, 14, 18, 15, 59, 75, 93, 25

   2) After inserting the above numbers, calculate the probability for each empty slot that will be the next one filled.

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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 an algorithm that counts the number of leaves in a binary tree.

2. Assume there are two **ascending** ordered lists L1 and L2, please merge L1 and L2 into a new **ascending** ordered list L3. There will be **no duplicate** items in L3.

注：试题字迹务必清晰，书写工整。　　　　　　　　本题共 4 页，本页为第 4 页

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