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53/53

课程进度

视频：0/47 作业：0/8 考试：0/1

0/56

你的学习进度

开始学习

通知公告

课程内容

- 章节内容
- 课程表

课程社区

- 课程动态
- 课程互动
- 课程调查

练习考试

- 课后作业

- 互评作业
- 编程练习
- 综合考试

课程资料

- 课件下载
- 参考资料

学习笔记

- 课程笔记

课程信息

- 课程说明
- 课程大纲
- 考核标准

学习结果

- 课程证书

综合考试返回

期末考试查看

-

截止日期：

考试状态： **待考试**

2018-01-02 23:00（北京时间） 已截止

试卷总分：23 分

考试时间：120 分钟

-

主办单位:

战略合作:

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- 联系方式

媒体报道

期末考试

- 题数：23 道
- |
- 总分：23 分
- |
- 截止日期：2018-01-02 23:00
-

1、

(1分)

由小到大写出以下时间复杂度的序列：

Ascending write the sequence of followings according to their time complexit：

(1)n^2+100n

(2)$3n^2+100n^2$

(3)$10+3Log10n$

(4)10n+20nLog10n

-

(5)2n

-

(6)1000n

-
-

答案直接写标号，如：(1)(2)(3)(4)(5) （提示：系统基于字符匹配来判定答案，所以您的答案中不要出现空格）

-

Write down the answer labels such as (1)(2)(3)(4)(5). （Hint：This problem is judged by string matching, Please make sure your answer don't contain any blanks.

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-

-

答案: (3)(6)(4)(1)(2)(5)

-

-

2、

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(1 分)

-

计算运行下列程序段后 s 的值：

-

After running the following program segment, the value of s is:

-

```
n=10;s=0;
for ( k = 1; k < n-1; k++ )
   for ( j = n; j >= k; j--)
      s=s+1;
```

-

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显示解析

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答案： 52

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3、

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(1 分)

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双端队列可以在队列的两端进行插入和删除操作，既可在队尾进行插入/删除，又可在队头进行插入/删除。现有 11 个不同的元素顺序输入到双端队列，那么可以得到多少种不同的排列？

-

Deque can do insert and delete operations on both ends of the queue, can insert / delete in the team head and also in the tail. Existing 11 different elements enter the double-ended queue orderly, then how many different permutations can you get?

-

-

显示解析

-

答案: 1024

4、

(1分)

顺序栈是用一段连续的空间存储内容，本质是顺序表。链式栈则是采用单链表的方式存储。下列关于这两种存储方式的说法正确的是：

Sequential stack stores elements in a contiguous space, which is essentially a sequential list. Linked stack is implemented by a single linked list instead. Which of the following about the two storage methods are correct? (multiple choice)

A、 顺序栈的压栈和出栈操作只需常数时间。 The push and pop operation of sequence st only needs constant time.

B、 链式栈的压栈和出栈操作只需常数时间。 The push and pop operation of linked st only needs constant time.

C、 顺序栈需要指定一个具体的长度 Sequential stack needs to be assigned a specif length.

D、 链式栈需要一个结构性开销 Linked stack needs a structural cost.

答案: A,B,C,D

5、

(1 分)

按照课程中介绍的机械的递归转换，将下列递归过程改写为非递归过程后，程序中需要设置_____个语句标号。

According to the description in class about recursive mechanical conversion, rewritten the following recursive procedure into non recursive process, the program needs set _____ statement labels.

```
void  test(int &sum) {
   int  x;
   scanf(x);
   if (x == 0)
      test(sum);
      sum = 0;
   else {
      test(sum);
      sum += x;
   }
   printf(sum);
}
```

显示解析

答案: 4

6、

(1分)

若字符串 s ="DataMining"，则其子串的数目为 （字串数目应该重复计算）

-

If the string s = "DataMining", then the number of its substrings is:_____. （If we encounter the same substring , the total should be added one）

-

-

显示解析

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答案: 56

-

-

7、

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(1 分)

-

在字符{A，C，G，T}组成的 DNA 序列中，A —— T 和 C —— G 是互补对。

判断一个 DNA 序列中是否存在互补回文串（例如，ATCATGAT 的补串是 TAGTACTA，与原串形成互补回文串；即要求整个原串的补串是原串的逆序）；

下面 DNA 序列中存在互补回文串的是：(多选)

In DNA sequences consisting of characters {A, C, G, T}, A - T and C - G are complementary pairs respectively.

Determine whether a DNA sequence has a complementary palindromic string (For example, ATCATGAT's complementary string is TAGTACTA, with is the palindromic sequence to the original string; in such case the complementary string is also the reverse of the original string);

Which of the following DNA sequences have complementary palindromic string? (multiple choice)

A、 CTGATCAG

B、 AATTAATT

C、 GTACGTAC

D、 AGCTAGCT

答案: A,B,C,D

8、

(1 分)

使用 KMP 算法求出模式 p=”aabcaabbaa”的优化后的 next 数组。注意：只列出数字，数字之间用一个空格分隔。比如：0 0 0 0 0 0 0 0 0 0

Use KMP algorithm to derive the optimized "next" array for the patter n p = "aabcaabbaa".

Note: Write down the numbers in the next array separated by single space.

-

For example: 0 0 0 0 0 0 0 0 0 0

-

-

答案: -1 -1 1 0 -1 -1 1 3 -1 -1

-
-

9、

-

(1 分)

-

利用上题 p=”aabcaabbaa”优化后的 Next 数组，对 t=”aaabaabcabaabcaabbaab”进行匹配。有多少次字符比较？（注意：每一次 p 中的字符与 t 中的字符的一次比较计做一次）

-

Use the optimized "next" array above for pattern p = "aabcaabbaa"to match the target string t = "aaabaabcabaabcaabbaab". How many character comparisons are needed?

-

(Note: Each comparison of the characters between p and t counts once)

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显示解析

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答案: 22

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-

10、

-

(1 分)

-

一个有 4 层结点的完全二叉树。按前序遍历周游给结点从 1 开始编号，则第 21 号结点的父结点是多少号？（注释：根的层数为 0，第四层的节点是完全铺满的）

-

For a complete binary tree with four levels, label the nodes starting from 1 according to the preorder traversal. what is the label of the parent node for node 21? (The root is on level 0)

-

-

显示解析

-

答案: 19

-

-

11、

-

(1 分)

-

假设一棵二叉树中，度为 2 的结点有 20 个，度为 1 的结点有 10 个，度为 0 的结点有多少个？

-

In a binary tree, there are 20 nodes with a degree of 2 and 10 nodes with a degree of 1. How many nodes are with a degree of 0?

-

-

显示解析

-

答案: 21

-

-

12、

-

(1 分)

-

某二叉树中序序列为 A,B,C,D,E,F,G, 前序序列为 E,A,C,B,D,G,F, 则后序序列是？

-

（注意：答案不要含空格和逗号，比如可以是 ABCDEFG）

The infix order sequence of a binary tree is ABCDEFG, and its preorder sequence is EACBDGF. Please write down its postorder sequence. (No blank space or comma in your answer. For example ABCDEFG is a valid format.)

显示解析

答案: BDCAFGE

13、

(1分)

对于键值序列{38,64,52,26,73,40,48,55,15,12}，用筛选法建最小值堆，共交换元素多少次？

-

For the key value sequence {38,64,52,26,73,40,48,55,15,12}, use the bottom-up heapification method to construct a minimum heap. How many times should we exchange the elements in the array

-

-

显示解析

-

答案: 7

-

-

14、

-

(1 分)

-

以数据集{4，5，6，7，10，12，18}为结点权值所构造的哈夫曼树，其带权路径长度为？

Construct a Huffman tree with the weights {4，5，6，7，10，12，18}. What is the weighted external path length?

显示解析

答案: 165

15、

(1 分)

一个深度为 h 的满 k 叉树，最多有多少个结点？（独根树深度为 0）

For a full k-ary tree with depth h, how many nodes could it have at most? (the depth of a tree with only one node is 0)

A、
$(K_{h+1}-1)/(k-1)$

B、
K_{h-1}

C、
K_h

D、
$(K_h-1)/(k-1)$

显示解析

答案： A

16、

(1 分)

从空二叉树开始，严格按照二叉搜索树的插入算法（不进行旋转平衡），逐个插入关键码{15, 82, 10, 4, 55, 89, 29, 45, 54, 35, 25}构造出一颗二叉搜索树，对该二叉搜索树按照后序遍历得到的序列为（每两个元素之间用一个空格隔开）

Given a null binary tree, insert key values {15, 82, 10, 4, 55, 89, 29, 45, 54, 35, 25} successively according to the insertion algorithm of a binary search tree strictly (no rotation and balance) to construct a binary search tree. Please write down the sequence of post order of this binary search tree. (There is one blank space between two elements)

显示解析

答案: 4 10 25 35 54 45 29 55 89 82 15

17、

（1分）

对二叉排序树（即 BST，也称“二叉搜索树”）进行什么 遍历，可以得到该二叉树所有结点构成的排序序列？

From which traversal can we get the ordered sequence of the nodes of a binary search tree?

A、 前序 preorder

B、 后序 postorder

C、 按层次 levelorder

D、 中序 inorder

显示解析

答案： D

18、

（1分）

-

2-3 树是一种特殊的树，它满足两个条件：

-

（1）每个内部结点有两个或三个子结点；（2）所有的叶结点到根的路径长度相同；

-

如果一棵 2-3 树有 10 个叶结点，那么它可能有_____个非叶结点。 (多选)

-

2-3 tree is a special kind of tree, which satisfies:

-

（1） Every internal node has 2 or 3 children nodes. (2) All the leaf nodes have the same path length from the root node.

-

If a 2-3 tree has 10 leaf nodes, then it may have _____ non-leaf nodes. （multiple choice）

-

-

A、 8

B、 7

C、 5

D、 6

显示解析

答案： A,B

19、

(1分)

对于以下等价类，采用"加权合并规则"（也 称"重量权衡合并规则"），进行并查运算，给出最后父结点索引序列。

1-2 5-1 1-6 0-3 7-4 6-9 5-3 0-8 4–8

注意：当合并大小相同的两棵树的时候，将第二棵树的根指向第一棵树的根；根结点的索引是它本身；数字之间用一个空格隔开

Given the following equivalence pairs, please use the "union-by-weight rule" and the UNION/FIND algorithm to obtain the final parent node index sequence.

1-2 5-1 1-6 0-3 7-4 6-9 5-3 0-8 4-8

Notice: When we merge two trees with the same size, we let the root of the second tree point to the root of the first tree. The parent index of the root node is itself. Separate the numbers with only one space.

显示解析

答案：1 1 1 0 7 1 1 1 1 1

-

-

20、

-

(1分)

-

根据伪满二叉树的前序序列，求 ltag-rlink 的二叉树前序遍历

-

比如：给出伪满二叉树的前序序列如下：

-

A' B' D G' / H C' E' F I /

-

则可以求出 ltag-rlink 的二叉树前序遍历为

-

0A5 0B3 1D-1 1G4 1H-1 0C-1 0E8 1F-1 1I-1

(注：各个结点按照“ltag 结点名 rlink”的方式给出，结点之间用一个空格分隔）

现给出伪满二叉树的前序序列如下：

A' B' C' / I H D' E' G / F

则所求出 ltag-rlink 的二叉树前序遍历为

According to the pre-order traversal sequence of a "pseudo full binary tree", please write down the pre-order traversal sequence of this binary tree in an "ltag-rlink" form.

For example: Given the pre-order traversal sequence of a "pseudo full binary tree" like this: A' B' D G' / H C' E' F I /

Then we can get the pre-order traversal sequence of this binary tree in the "ltag-rlink" form: 0A5 0B3 1D-1 1G4 1H-1 0C-1 0E8 1F-1 1I-1

(P.S. The form of each node should be "LtagNodeRlink", and all the nodes are separated by a single space.)

Now, given the pre-order traversal sequence of a "pseudo full binary tree" like "A' B' C' / I H D' E' G / F", please write down the pre-order traversal sequence of this binary tree in the "ltag-rlink" form.

显示解析

答案: 0A5 0B4 1C3 1I-1 1H-1 0D8 0E-1 1G-1 1F-1

21、

(1 分)

用相邻矩阵 A 表示图，判定任意两个顶点 Vi 和 Vj 之间是否有长度为 m 的路径相连，则只要检查_____的第 i 行第 j 列的元素是否为零即可。

Using an adjacency matrix A to represent a graph, we just need to check whether the element in the row i, column j of _____ is zero to tell whether there is a path with length m connecting vertex Vi and Vj.

A、 A^m

B、 mA

C、 A

D、 A^{m-1}

答案: A

22、

(1 分)

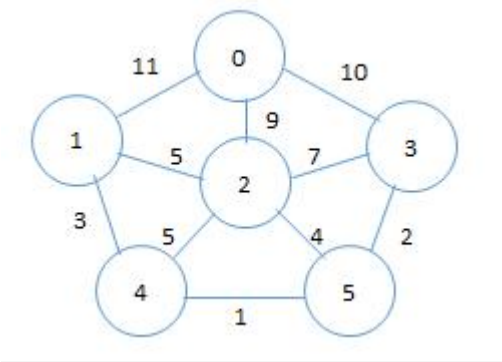
-

请使用 Kruskal 算法求出下图的最小生成树，依次写出每次被选择的合法的合并代价最小的边的编号，用一个空格分隔（如果同时存在多条边满足要求，选择编号最小的）。顶点 a 到顶点 b（a<b）之间的边编号为 ab，例如图中权值为 1 的边编号为 45。

-

Please use Kruskal algorithm for the following graph to find the minimum spanning tree. Write down the edge labels which are selected in the minimum spanning tree one by one (if there are multiple valid edges, select the vertex with the minimum label). The label of an edge connecting vertex a and vertex b is ab (a<b). For example, the edge with a weight of 1 in the graph is labeled 45. (Separate different labels with a single blank space.)

-



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答案: 45 35 14 25 02

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23、

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(1 分)

-

求图的中心点。设 V 是有向图 G 的一个顶点， V 的偏心度定义为：

-

Find the central point of the graph. Let V be a vertex of the graph G, the definition of the eccentricity of V is:

-

$max\{dist(w,v),\forall w\in V(G)\}$

-
-

如果 v 是有向图 G 中具有最小偏心度的顶点，则称顶点 v 是 G 的中心点。

-

If the eccentricity of v is minimal in the graph G, then we call V a ce ntral point of G.

-

请从以下代码语句中选择正确的 5 条，填入空白处。按空白的标号顺序依次列出代码语句的标号,用一个空格分隔。如 A F D H C

-

Please choose 5 statements from the following, and put them into the blanks.

-

List the number of the statement you choose according to the order o f the blanks, and separate them with a single blank space. For instanc e, A F D H C.

-

```
void  FLOYD_PXD(AdjMatrix g) {//对以带权邻接矩阵表示的有向图
        AdjMatrix w=g ;
        for (k=1;k<=n;k++)
                for (i=1;i<=n;i++)
                        for (j=1;j<=n;j++)
                                if (    (1)      )
                                        (2)       ;
        v=1;
        dist=MAXINT;
        for (j=1;j<=n;j++) {
                s=0;
                for (i=1;i<=n;i++)
                        if (    (3)    )
                                s=w[i][j];
                if (  (4)       ) {
                        dist=s;
                        (5)       ;
                }
        } //for
        printf("有向图g的中心点是顶点%d,偏心度%d\n",v,dist);
}
```

for G which be represented by linking matrix

printf (“the center point of the directed graph G is %d, its ecc dist);

```
A.w[i][j]>w[i][k]+w[k][j];
B.w[i][j]>w[k][i]+w[j][k];
C.w[j][i]>w[i][k]+w[k][j];
D.w[i][j]=w[i][k]+w[k][j];
E.w[i][j]>s;
F.w[i][j]=w[k][i]+w[j][k];
G.w[j][i]<=w[i][k]+w[k][j]
I.w[j][i]>s;
J.s>dist;
K.v=j;
L.v=i;
M.dist>s;
```

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答案: A D E M K

-

提交