

# 数据结构与算法-北京大学-中国大学MOOC慕课答案

## 第一章 概论 测验

1、单选题：下列不属于线性结构的是： Which one of the followings does not belong to linear structure: (There is only one correct answer)

选项：

- A、队列(queue)
- B、散列表(hash table)
- C、向量(vector)
- D、图(graph)

参考：【**图(graph)**】

2、单选题：以下哪种结构是逻辑结构，而与存储和运算无关： Which of the following structure is a logical structure regardless of the storage or algorithm: (There is only one correct answer)

选项：

- A、队列(queue)
- B、双链表(doubly linked list)
- C、数组(array)
- D、顺序表(Sequential list)

参考：【**队列(queue)**】

3、多选题：关于算法特性描述正确的有： Which one is right about algorithm's characterization: (there are more than one correct answers)

选项：

- A、算法保证计算结果的正确性。 Algorithm will ensure the correctness of the calculation results.
- B、组成算法的指令可以有限也可能无限。 Instructions which composite algorithms can be infinite or finite
- C、算法描述中下一步执行的步骤不确定。 The next step in the implementation of the algorithm described is uncertain.
- D、算法的有穷性指算法必须在有限步骤内结束。 The finite nature of algorithms means algorithm must be completed within a limited step.

参考：【**算法保证计算结果的正确性。 Algorithm will ensure the correctness of the calculation results.#算法的有穷性指算法必须在有限步骤内结束。 The finite nature of algorithms means algorithm must be completed within a limited step.**】

4、多选题：下列说法正确的是： Which options may be correct? (there are more than one correct answers)

选项：

- A、如果函数 $f(n)$ 是 $O(g(n))$ ,  $g(n)$ 是 $O(h(n))$ , 那么 $f(n)$ 是 $O(h(n))$  【if  $f(n)$  is  $O(g(n))$ ,  $g(n)$  is  $O(h(n))$ , then  $f(n)$  is  $O(h(n))$ 】
- B、如果函数 $f(n)$ 是 $O(g(n))$ ,  $g(n)$ 是 $O(h(n))$ , 那么 $f(n)+g(n)$ 是 $O(h(n))$  【if  $f(n)$  is  $O(g(n))$ ,  $g(n)$  is  $O(h(n))$ , so  $f(n)+g(n)$  is  $O(h(n))$ 】
- C、如果 $a > 1$ ,是, 但不一定是 【if  $a > 1$ , is , may not be 】
- D、函数 $f(n)$ 是 $O(g(n))$ , 当常数 $a$ 足够大时, 一定有函数 $g(n)$ 是 $O(af(n))$  【if  $f(n)$ 是 $O(g(n))$ , When constant  $a$  is big enough , there must be  $g(n)$  is  $O(af(n))$ 】

参考：【**如果函数 $f(n)$ 是 $O(g(n))$ ,  $g(n)$ 是 $O(h(n))$ , 那么 $f(n)$ 是 $O(h(n))$  【if  $f(n)$  is  $O(g(n))$ ,  $g(n)$  is  $O(h(n))$ , then  $f(n)$  is  $O(h(n))$ 】 #如果函数 $f(n)$ 是 $O(g(n))$ ,  $g(n)$ 是 $O(h(n))$ , 那么 $f(n)+g(n)$ 是 $O(h(n))$  【if  $f(n)$  is  $O(g(n))$ ,  $g(n)$  is  $O(h(n))$ , so  $f(n)+g(n)$  is  $O(h(n))$ 】】**】

5、多选题：已知一个数组 $a$ 的长度为 $n$ , 求问下面这段代码的时间复杂度: An array of  $a$ , its length is known as  $n$ . Please answer the time complexity of the following code. (There are more than one answers.)  
for ( $i=0$ ,  $length=1$ ;  $i < n$ ;  $i++$ ) { for ( $j = i+1$ ;  $j < n$ ;  $j++$ ) if ( $length < j-i+1$ )  $length = j-i+1$ ;

选项：

- A、
- B、
- C、

D、

参考：【#】

6、填空题：计算运行下列程序段后m的值： Calculate the value of m after running the following program segment  $n = 9; m = 0; \text{for } (i=1; i=n; i++) \text{ for } (j = 2*i; j=n; j++) m=m+1;$  求m的值

参考：【20】

7、填空题：由大到小写出以下时间复杂度的序列： 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 the following time complexity in descending sequence: 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

(1)  $2^n$

(2)  $n^{2.5}$

(3)  $n(\log_5 n)^4$

(4)  $5n^2$

(5)  $2^{2^n}$

contain any blanks. )

参考：【(5)(1)(2)(4)(3)】

## 第二章 线性表测验

1、多选题：下面关于线性表的叙述中，正确的是哪些？ Which of the followings about linear list are correct? (There are more than one answers.) Select the answer that matches

选项：

- A、线性表采用顺序存储，必须占用一片连续的存储单元。 Linear lists use sequential storage which must occupy a continuous memory units.
- B、线性表采用顺序存储，便于进行插入和删除操作。 Linear lists using sequential storage, it is easy to do insert and delete operations.
- C、线性表采用链接存储，不必占用一片连续的存储单元。 Linear lists using the linked storage, do not occupy a continuous memory units.
- D、线性表采用链接存储，便于插入和删除操作。 Linear lists using the linked storage, it is easy for insert and deleting operations.

参考：【线性表采用顺序存储，必须占用一片连续的存储单元。 Linear lists use sequential storage which must occupy a continuous memory units.#线性表采用链接存储，不必占用一片连续的存储单元。 Linear lists using the linked storage, do not occupy a continuous memory units.#线性表采用链接存储，便于插入和删除操作。 Linear lists using the linked storage, it is easy for insert and deleting operations.】

2、多选题：下面的叙述中正确的是： Select the answer that matches (There are more than one correct answers)

选项：

- A、线性表在链式存储时，查找第i个元素的时间与i的数值无关。 When the linear list stored in linked form, the time to find the i-th element is regardless of the value of i.
- B、线性表在顺序存储时，查找第i个元素的时间与i的数值成正比。 When the linear list stored sequentially, the time to find the i-th element is proportional to value with i.
- C、线性表在顺序存储时，查找第i个元素的时间与i的数值无关。 When the linear list stored sequentially, the time to find the i-th element is regardless of the value of i.
- D、线性表在链式存储时，插入第i个元素的时间与i的数值成正比。 When linear lists stored in the linked form, the time to insert the i-th element is proportional to value with i.

参考：【线性表在顺序存储时，查找第i个元素的时间与i的数值无关。 When the linear list stored sequentially, the time to

find the  $i$ -th element is regardless of the value of  $i$ .#线性表在链式存储时,插入第 $i$ 个元素的时间与 $i$ 的数值成正比。When linear lists stored in the linked form, the time to insert the  $i$ -th element is proportional to value with  $i$ .】

3、多选题:完成在双循环链表结点 $p$ 之后插入 $s$ 的操作为: The operation to insert  $s$  after the doubly circular linked list's node  $p$  is: (There are more than one answers.)

选项:

- A、 $p\text{-next-prev}=s; s\text{-prev}=p; s\text{-next}=p\text{-next}; p\text{-next}=s;$
- B、 $p\text{-next-prev}=s; p\text{-next}=s; s\text{-prev}=p; s\text{-next}=p\text{-next};$
- C、 $s\text{-prev}=p; s\text{-next}=p\text{-next}; p\text{-next}=s; p\text{-next-prev}=s;$
- D、 $s\text{-next}=p\text{-next}; p\text{-next-prev}=s; s\text{-prev}=p; p\text{-next}=s;$

参考:【 $p\text{-next-prev}=s; s\text{-prev}=p; s\text{-next}=p\text{-next}; p\text{-next}=s; \#s\text{-next}=p\text{-next}; p\text{-next-prev}=s; s\text{-prev}=p; p\text{-next}=s;$ 】

4、填空题:对于一个具有 $n$ 个结点的单链表,在已知的结点 $*p$ 后插入一个新结点的时间复杂度为 $O(\quad)$ ,在给定值为 $x$ 的结点后插入一个新结点的时间复杂度为 $O(\quad)$ 。(请依次填入,格式为(a)(b),如果您的答案中出现字母,请使用小写;后一空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) For a single linked list with  $n$  nodes, and after a known node  $*p$  to insert a new node, the time complexity is  $O(\quad)$ ; after a given node with  $x$  value insert a new node, the time complexity is  $O(\quad)$ . (If your answer contains letters, use lowercase one. The second blank is judged by string matching, Please make sure your answer don't contain any blanks.)

参考:【(1)(n)】

5、填空题:设某循环链表长度为 $n$ ,并设其中一节点为 $p_1$ ,然后按照链表的顺序将后面的节点依次命名为 $p_2, p_3, \dots, p_n$ ,那么请问 $p_n.\text{next}=\quad$ (答案为一个节点名,注意所有字母为小写且答案中不包含空格)

参考:【 $p_1$ 】

### 第三章 栈与队列测验

1、单选题:设栈 $S$ 和队列 $Q$ 的初始状态为空,元素 $e_1, e_2, e_3, e_4, e_5$ 和 $e_6$ 依次通过栈 $S$ ,一个元素出栈后即进队列 $Q$ ,若6个元素出队的序列是 $e_2, e_4, e_3, e_6, e_5, e_1$ 则栈 $S$ 的容量至少应该是\_\_\_\_\_。 Assume that the stack  $S$  and queue  $Q$ 's initial state is empty, the elements  $e_1, e_2, e_3, e_4, e_5$  and  $e_6$  followed through stack  $S$ , an element out the stack means into the queue  $Q$ . If the sequence the six elements out of the queue is  $e_2, e_4, e_3, e_6, e_5, e_1$  then stack  $S$  of capacity should be at least \_\_\_\_\_ . (There is only one correct answer)

选项:

- A、2
- B、3
- C、4
- D、6

参考:【3】

2、单选题:现有中缀表达式 $E=((100-4)/3+3*(36-7))*2$ 。以下哪个是与 $E$ 等价的后缀表达式? Existing infix expression  $E = ((100-4)/3+3*(36-7))*2$ . Which of the following is the equivalent postfix expression of  $E$ ? (There is only one correct answer)

选项:

- A、 $((1004-)/3/3(367-)*+)*2*$
- B、 $*+/-10043*3-3672$
- C、 $1004-3/3367-*+2*$
- D、 $*(+/(1004)3*3(-367))2$

参考:【 $1004-3/3367-*+2*$ 】

3、多选题:队列的特点包括: Queue' features include: (There are more than one answers.)

选项:

- A、后进先出Last-in first-out (LIFO)
- B、先进后出First-in last-out (FILO)
- C、先进先出First-in first-out (FIFO)

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