Exercises 2

(1) the following exercises are only for your references

2-1 Describe the advantages and disadvantages of the sequence storage structure (顺序存储结构) and the linked storage structure (链式存储结构); the difference among the head pointer, the first node and the first element node. Outline the characteristics of an ordered list (有序表), and the similarities and differences between a vector (向量 or 数组) and an ordered table, the functions (功能) of the head pointer variables and the head node.

2-2 Design an algorithm to delete ith element in a vector, and estimate its time efficiency.

2-3 Try to design an algorithm for getting the node number and deleting the first node in a circular linked list (循环链表).

2-4 Knowing that the elements in the linear list L= (a_1, a_2, …, a_n) is ordered increasingly, and using a vector to store data, try to writing an algorithm to delete the elements between c and d (c ≦ d) in the linear list L= (a_1, a_2, …, a_n).

2-5 Assuming that the length of a circular linked list is larger than 1, which has no head node or head pointer, p is a pointer to some node in the circular linked list, try to write an algorithms to delete the precursor node (直接前趋结点) of the node pointed by p.

2-6 In a double linked list (双向链表), implement the following basic operations for the double linked list: ①Initialize; ②Locate; ③Insert; ④delete.

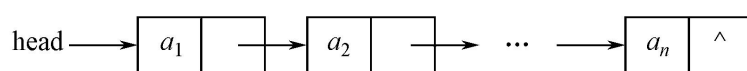2-7 Knowing a linked list as shown in Fig.2.1, try to write an algorithm to make a backup for the linked list.

Fig.2.1 a linked list

2-8 ①Given a circular linked list in Fig.2.2, please write a program to reverse all of the arrows.
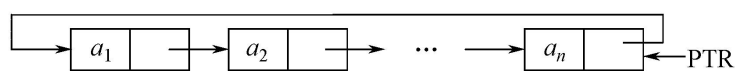

Fig.2.2 a circular list

②Given a double circular linked list L=(a, b, c, d) in Fig.2.3, please write some simple operations to transform L=(a, b, c, d) into L= (b, a, c, d).
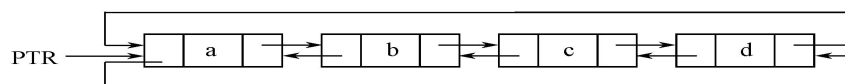

Fig.2.3 a double circular linked list

2-9 简述下列术语：线性表，顺序表，链表。

2-10 何时选用顺序表，何时选用链表作为线性表的存储结构合适?各自的主要优缺点是什么?

2-11 在顺序表中插入和删除一个结点平均需要移动多少个结点?具体的移动次数取决于哪两

个因素?

2-12 链表所表示的元素是否有序?如有序，则有序性体现于何处?链表所表示的元素是否一定要在物理上是相邻的?有序表的有序性又如何理解?

2-13 设顺序表 L 是递增有序表，试写一算法，将 x 插入到 L 中并使 L 仍是递增有序表。

2-14 写一求单链表的结点数目 ListLength(L)的算法。

2-15 写一算法将单链表中值重复的结点删除，使所得的结果链表中所有结点的值均不相同。

2-16 写一算法从一给定的向量 A 删除值在 x 到 y(x≤y)之间的所有元素(注意：x 和 y 是给定的参数，可以和表中的元素相同，也可以不同)。

2-17 设 A 和 B 是两个按元素值递增有序的单链表，写一算法将 A 和 B 归并为按按元素值递减有序的单链表 C，试分析算法的时间复杂度。

(2) the following exercises must be submitted by you.

2-18 Suppose $X = (x_1, x_2, \ldots, x_n)$ and $Y = (y_1, y_2, \ldots, y_m)$ are two linear linked list, try to write an algorithm to combine the two linear linked lists to one linear linked list. Please do not change the physical locations of the nodes, and the combined new linear linked list is following:

$X = (x_1, y_1, x_2, y_2, \ldots, x_m, y_m, x_{m+1}, \ldots, x_n)$,　　when $n \geq m$;

$X = (x_1, y_1, x_2, y_2, \ldots, x_n, y_n, y_{n+1}, \ldots, y_m)$,　　when $n < m$.

2-19 Suppose there is an airlines ticket booking system. The system has a double linked list which is used to represented all of the passengers. The nodes in the double linked list are order in alphabetical by the beginning letters of the passenger's surnames. Following is a list of the passengers at some time. Write an algorithm for the ticket booking system to modify the double linked list when any passenger books a ticket or refund a ticket.（此题为上机实习题目，要求上交实验报告，并且参考程序已经发到了 QQ 群)。

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