Exercises 5

(1) The following assignments are just for your reference.

1 A is a 2-D symmetric array（二维对称矩阵）, to save the storage space, we just store the upper triangular element, try to deduct the addressing formula.

2 We have three arrays A[n+1], B[n+1][m], C[n+1][n+2], how many elements can these arrays have separately?

3 A 3-D array A[2][3][4]（三维矩阵）, suppose that the length of each array element is 4 Bytes，please calculate the relative address of $A_{2,3,2}$.

4 Suppose A is a upper triangular matrix（上三角矩阵）with n rows and n columns. Store its non-zero elements to an 1-D array b[1…n(n+2)/2] in column order, and b[1] stores $a_{1,1}$, write the addressing formula of $a_{i,j}$.

5 A given n-D array $a[l_1…u_1, l_2…u_2, …, l_n…u_n]$, if the storage address of $a[l_1,l_2,…,l_n]$ is α, give the storage address of $a[i_1, i_2, …, i_n]$.

6 Do HEAD operation and TAIL operation on the generalized list LS=(a, ((b, c), (), d), ((e))), and give its storage structure.

7 Give the logic structure of the generalized list according its storage structure shown in the following Fig.1

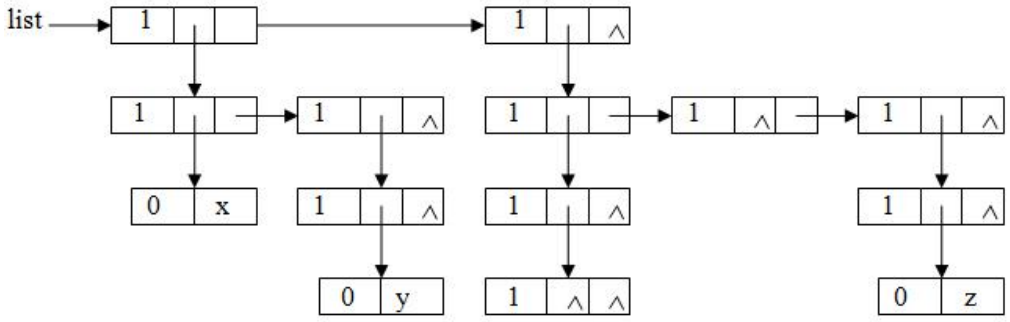

Fig. 1

8 设有稀疏矩阵 B 如下图所示，请画出该稀疏矩阵的三元组表和十字链表存储结构。

$$\Delta = \begin{pmatrix} 0 & 3 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -3 & 0 & 0 & 0 & 0 & 0 & 0 & 4 \\ 0 & 0 & 2 & 0 & 0 & 2 & 0 & 0 \\ 0 & 18 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 4 & 0 & 5 & 0 \\ 0 & 0 & -3 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

(2) The following assignments must be submitted by you.

1 An element a[i][j] of a m×n matrix satisfies the following conditions: a[i][j] is both the minimum of i*th* row and the maximum of j*th* column. Try to write an algorithm to find such the element a[i][j] in an array, and analysis the time complexity of your algorithm.

2 设 A 和 B 是稀疏矩阵，都以三元组作为存储结构，请写出矩阵相加的算法，其结果存放在三元组表 C 中，并分析你的算法时间复杂度。