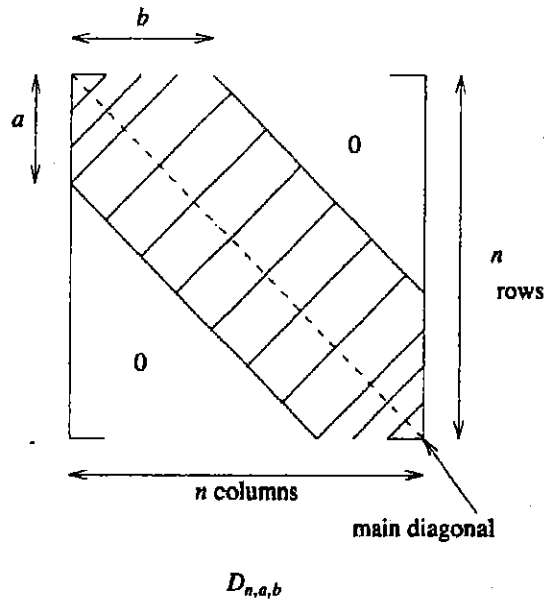


※請在答案卷內作答

- 一 (10%) A generalized band matrix  $D_{n,a,b}$  (shown below) is an  $n \times n$  matrix in which all the nonzero terms lie in a band made up of  $a-1$  diagonals below the main diagonal, the main diagonal, and  $b-1$  bands above the main diagonal.
- (一) (5%) Obtain a sequential representation of the band matrix in one dimensional array  $e$ .
- (二) (5%) Write a function  $P(n, a, b, i, j, e)$  to retrieve the value of element  $d_{ij}$  in the matrix from array  $e$ .



- 二 (10%) Given a definition of the Fibonacci series as

$$Fib(n) = \begin{cases} 0 & \text{if } n = 0 \\ 1 & \text{if } n = 1 \\ Fib(n-1) + Fib(n-2) & \text{otherwise.} \end{cases}$$

Write an algorithm (non recursive) to generate the Fibonacci series by using a stack.

- 三 (10%) Convert a postfix expression  $AB/C-DE^*+AC^*-$  to an infix expression by using a stack. Your answer should include step-by-step status of input, stack, and output.

- 四 (10%) Show the linked list representation of a sparse matrix

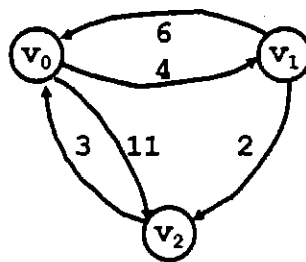
1	0	0	3
0	4	0	5
0	0	0	0
0	0	0	1
8	0	2	0

注意：背面有試題

參考用

※請在答案卷內作答

- 五 (10%) Given a polynomial  $f(x) = 7x^{10}y^2 + 10x^8y^4 + 4y$ , show the linked list representation of  $f(x)$
- 六 (10%) Write the status of the list  $F = \{179, 208, 306, 93, 859, 984, 55, 9, 271, 33\}$  at the end of each phase of radix sort. Use radix = 10.
- 七 (10%) For an AVL tree,
- (一) (2%) What is the balance factor of a node?
  - (二) (4%) Describe the possible cases of an imbalanced node after an addition?
  - (三) (4%) Describe the possible cases of an imbalanced node after a deletion?
- 八 (10%) Given the list  $\{26, 5, 77, 1, 61, 11, 59, 15, 48, 19\}$ ,
- (一) (5%) If the list is stored in an array, please transfer the array into a heap.
  - (二) (5%) Please draw each step of heap sort on the heap.
- 九 (10%) There are two algorithms Kruskal and Prim that can be used to construct a minimum-cost spanning tree of a connected, undirected graph. In what cases you will use Kruskal? And when will you use Prim? Explain why.
- 十 (10%) Find the all-pairs shortest paths of the following graph.



注意：背面有試題

參考用