國立高雄科技大學 109 學年度碩士班 招生考試　試題紙

系 所 別：資訊工程系碩士班　　組　別：不分組

考科代碼：2031　　考　科：資料結構

＝＝

注意事項：

1、各考科一律可使用本校提供之電子計算器，考生不得使用自備計算器，違者該科不予計分。

2、請於答案卷上規定之範圍作答，違者該題不予計分。

1. (10%) For each of the following algorithm, what is the tightest asymptotic upper bound for the worst-case running time? No need to justify your answers.

(i) Bubble sort for *n* numbers

(ii) Quick sort for *n* numbers

(iii) Heap sort for *n* numbers

(iv) Kruskal's algorithm for a graph of *V* vertices and *E* edges

(v) Binary tree search for a tree of *n* vertices

2. (10%) Draw the binary tree whose in-order sequence is D B H E A I F C G J and whose post-order sequence is D H E B I F J G C A.

3. (10%)

(i) Please create a min heap tree according to the input order of data: 3, 5, 1, 9, 6, 4, 8, 7, 2.

(ii) What is the result after delete 1 from the above min heap tree?

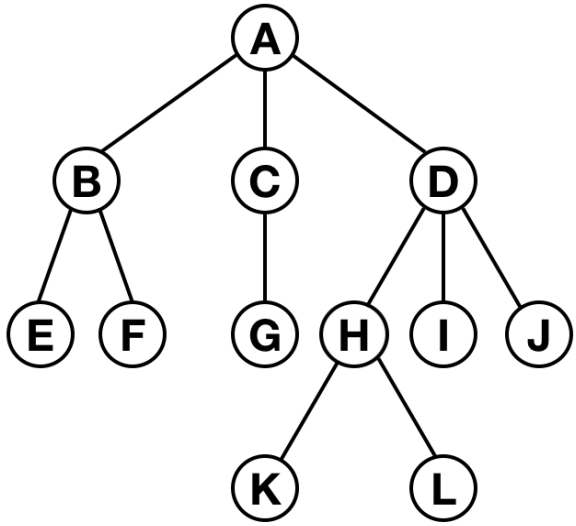
4. (10%) Assume a three-dimension array A[-3..3, 0..4, 2..6], what is the address for A[0, 1, 3] if the starting address is 278, the size of each element is 1 and it is stored as row-major?

5. (10%) A hash table has 10 buckets. Draw the hash table after inserting the following numbers in order: 49, 9, 29, 7, 19, 89 and a hash function $h(k) = k \bmod 10$.

(i) Use linear probing to handle the overflow.

(ii) Use quadratic probing to handle the overflow.

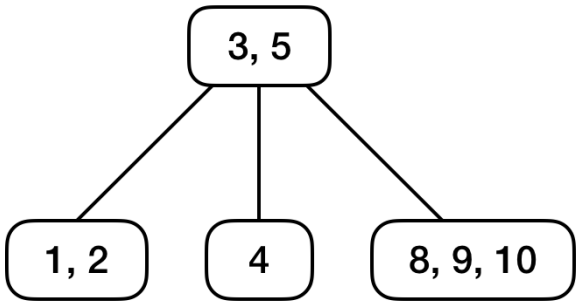
6. (10%) Draw the binary tree that corresponds to the left child-right sibling representation of the following tree.



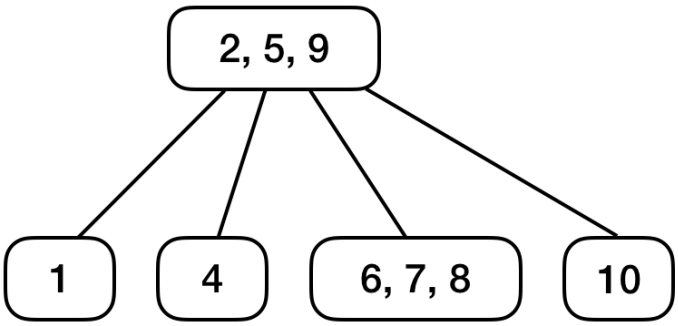
7. (10%) Write a **recursive** pseudocode for Tower of Hanoi problem. How many movements are needed to move 5 disks?

8. (10%)

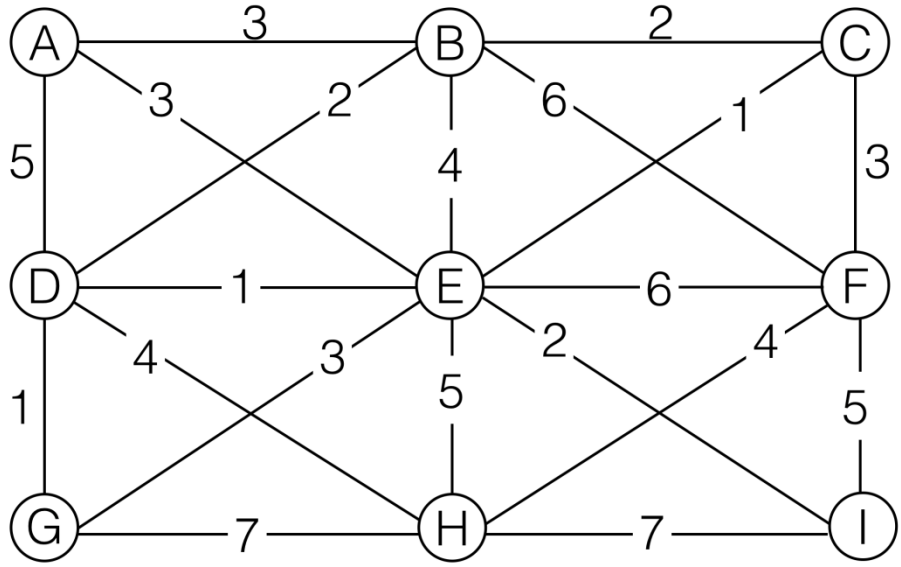
(i) Insert 7 into the following 2-3-4 tree.



(ii) Delete 1 from the following 2-3-4 tree.



9. (10%) Use **Kruskal's** and **Prim's** algorithms to find the minimum-cost spanning tree from the following graph.



10. (10%) Use **merge sort** to perform sorting (in ascending order) on data: 24, 8, 2, 90, 7, 33, 56, 18, 83, 67 (detail needed).