一、填充、選擇、與是非 (48%, 每題3分)

1. _____ As a consequence of using a FIFO storage policy, the last element inserted in the queue will be the last element removed.　　A) True　　B) False

2. _____ Nodes in a general tree can have any number of subtrees.
A) True　　B) False

3. _____ The largest item is always removed first from a priority queue.
A) True　　B) False

4. _____ The set of vertices and the set of edges that comprise a graph must be finite.
A) True　　B) False

5. _____ If the graph represented by an adjacency matrix is undirected, then the matrix is symmetric, and only the lower diagonal of the matrix need be saved.　　A) True　　B) False

6. _____ By implementing a queue based on a linear array, we can do an insertion at the rear of the array in _____ time.　　A) O(1)　　B) $O(n \log_2 n)$　　C) O(n)　　D) $O(n^2)$

7. _____ If node A is the parent of node B, which is the parent of node C, which in turn is the parent of node D, node A is an ancestor of nodes B, C, and D, and node D is a _____ of nodes A, B, and C.
A) sibling　　B) parent　　C) leaf　　D) descendant

8. _____ Just as with a binary search of an array (or vector), each probe into the binary search tree has the potential of eliminating _____ of the elements in the tree. A) one-quarter　　B) one-third　　C) one-half　　D) three-quarters

9. _____ A(n) _____ traversal algorithm traverses the left subtree, visits the root, and then traverses the right subtree.
A) inorder　　B) preorder　　C) postorder　　D) randomorder

10. _____ In a(n) _____, the value in each node is greater than all values in the node's subtrees.
A) binary tree　　B) binary search tree　　C) B-tree　　D) heap

11. _____ Searching a binary search tree is an O(_____) process.
A) 1　　B) log n　　C) n　　D) n log n

12. _____ Suppose an undirected graph G is defined by the following vertex and edge sets.
V = {A, B, C, D, E},　　E = {(A, B), (A, C), (B, A), (B, D), (C, D), (D, E)}
By removing the edge _____ from set E, G becomes a simple graph.
A) {A, C}　　B) {B, A}　　C) {B, D}　　D) {D, E}

13. _____ In a(n) _____ queue, the elements wrap around so that the first element actually follows the last.

14. _____ A node in a single linked list would store a total of _____ pointer.

15. _____ The _____ of a node is a measure of its distance from the root.

16. _____ An undirected graph is called a(n) _____ graph if there is a path from every vertex to every other vertex.

＜背面繼續＞

二、問答題（52%）

1. (5%) Using the documentation comment as a guide, correct the logic and syntax errors in the following function.

```
/* compute factorial of integer n
    執行前: integer n is positive
    執行後: return integer factorial value of n        */
factorial (double n){
  int result;
  double index  = 1
  while (index < n)
    result *= index
    index+;
  return index;
}
```

2. (10%) Determine how many times the output statement is displayed in each of the following fragments. Indicate whether the fragment execution time is O(n) or O(n^2).

```
a. for (int i = 0; i < n; i++)
   for (int j = 0; j < 2; j++)
     cout << i << " " << j << endl;
b. for (int i = 0; i < n; i++)
   for (int j = n - 1; j >= i; j--)
     cout << i << " " << j << endl;
```

3. (5%) Why are queues more suitable than stacks for processing print jobs?

4. (10%) Give an example (order: 35, 20, 30, 50, 45, 60, 18, 25) to show how heap sort works. Please also analyze its time complexity O( ) to sort n elements.

5. (12%) Please complete the following notation translation.

Infix	Prefix	Postfix
(1)	+ × - × A B C × D E / × F G H	(2)
(3)	(4)	A B C × D E + - / F G - ×
A and B or C or not(E>F)	(5)	(6)

6. (10%) Which data structure is most suitable for solving maze (迷宮) problem? Explain your reason.