國立彰化師範大學 103 學年度<u>碩士班</u>招生考試試題

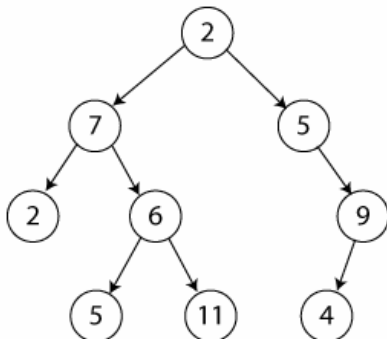## I.　Multiple-choice questions (50%)

1. A data structure can be _____.
   (A) an array　　　　(B) a record　　　　(C) a link list　　　　(D) all of the above

2. An array that consists of just rows and columns is a _____ array.
   (A) one-dimensional　　(B) two-dimensional　　(C) three-dimensional　　(D) multidimensional

3. Given a linked list called children, the pointer variable children identifies _____ element of the linked list.
   (A) the first　　　　(B) the second　　　　(C) the last　　　　(D) any

4. If A is the first data element input into a stack, followed by B, C, and D, then _____ is the first element to be removed.
   (A) A　　　　(B) B　　　　(C) C　　　　(D) D

5. The push operation _____ of the stack.
   (A) deletes an item from the top　　　　(B) deletes an item from the bottom
   (C) inserts an item at the top　　　　(D) inserts an item at the bottom

6. Consider the time complexity　(A) O(1)　　(B) O(n log n)　　(C) $O(n^2)$　　(D) O(n!),
   and suppose n is sufficiently large. _____ is the worst.

7. _____ is the pre-order traversal result of the following binary tree.
   (A) 2, 7, 5, 2, 6, 9, 5, 11, 4　　　　(B) 2, 5, 11, 6, 7, 4, 9, 5, 2
   (C) 2, 7, 5, 6, 11, 2, 5, 4, 9　　　　(D) 2, 7, 2, 6, 5, 11, 5, 9, 4

8. _____ is false for the following equation:

(A) $5n^2-6n=O(n^2)$　　　(B) $100n^2+2^n=O(2^n)$　　　(C) $100+5=O(1)$　　　(D) $n^2=(n \log^2 n)$

9. _____ is the running time of following program.

(A) $O(1)$　　　　　　(B) $O(n)$　　　　　　(C) $O(n^2)$　　　　　(D) $O(n^3)$

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sum = 0；
    for(i = 1；i < n；i++)
       for(j = 1；j < i*i；j++)
          if (j % i == 0)
             for(k = 0；k < j；k++)
                sum++；
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10. Given the numbers: 20, 62, 31, 14, 1, 25, 3, 9, 11 and the hash function H(x) = x mod 11. _____ will have the collision.

(A) (20, 62) and (31, 34)　　　　　　　　(B) (1, 25) and (19, 11)

(C) (31, 14) and (25, 3)　　　　　　　　(D) (20, 31) and (14, 25, 3)

II. 簡答題 (50%)

1. 對一個雜湊函數(Hashing function)而言，何謂碰撞 (Collision)？ 請簡述常見的解決方法之重雜湊法(Rehashing)。(15%)

2. 試簡要說明何謂堆疊(stack)與佇列(queue)，並分別比較其優缺點，再舉出兩個分別適用的應用例子。(15%)

3. 請說明數位學習可以運用的領域，請舉例？ (20%)