

系所組別：會計學系乙組

考試科目：資料結構

考試日期：0308，節次：3

※ 考生請注意：本試題 可 不可 使用計算機

一 選擇題 (30%)

- 1) If a queue contained the entries w, x, y, z (from head to tail), which of the following would be the contents after two entries were removed and the entry r was inserted?
A. w, x, r B. y, z, r C. r, y, z D. r, w, x
- 2) A _____ is an object containing information which refers to data stored elsewhere, as opposed to containing the data itself.
A. cookie B. heap C. reference D. ontology
- 3) Why is writing easily modifiable code important?
A. Easily modifiable code generally has a quicker run time.
B. Most real world programs require change at some time.
C. Most text editors make it easy to modify code.
D. Several people may be writing the same function at the same time.
- 4) Why is it important to test boundary values when testing programs?
A. Calculating by hand, it's easy to find the right answers for boundary values.
B. Debuggers are easier to use when testing boundary values.
C. In practice, a large proportion of errors arise from boundary values.
D. The correct execution of a function on all boundary values proves a function is correct.
- 5) Which software tool will best help you determine whether your test cases are fully exercising your code?
A. Compiler B. Debugger C. Make D. Pine E. Profiler
- 6) When measuring the efficiency of an algorithm, the following properties can be used except
A. speed or running time B. types of devices used to executed the algorithm C. space D. total energy consumed
- 7) A _____ is an abstract data type that is composed of a collection of unique keys and a collection of values, where each key is associated with one value.
A. list B. map C. record D. vector
- 8) A simple graph has no loops. What other property must a simple graph have?
A. It must be directed.
B. It must be undirected.
C. It must have at least one vertex.
D. It must have no multiple edges.

(背面仍有題目,請繼續作答)

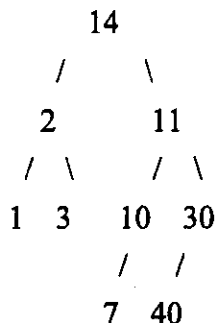
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Please use the following binary tree to answer the next two questions:



- 9) What is the depth of the binary tree?
A. 2 B. 3 C. 4 D. 9
- 10) Which of the following statements is correct?
A. The tree is neither complete nor full.
B. The tree is complete but not full.
C. The tree is full but not complete.
D. The tree is both full and complete.

二 問答題

- 1. Give the definition of the big-O notation. (4%)
Convert each time formula below to the best possible big-O notation.
A. $10n$ B. $2n^2 + 10n$ C. $3 \cdot \log_2(n)$ (6%)
- 2. Suppose we want to use binary search to search the sorted array $a[0], \dots, a[n-1]$ for a value x . Write both iterative and recursive versions of binary search. (20%)
- 3. Given an array A with n elements, what is the step count of the following function? (5%)

```

float rsum(float *A, const int n)
{
    if (n <= 0) return 0;
    else return (rsum(A,n-1) + A[n-1]);
}
    
```

- 4. Given an array A with n elements. Write the insertion sort algorithm to sort A . What is its worst-case running time? (10%)

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5. Answer the following questions regarding binary tree and explain how you obtain your answers:
- A. What is the maximum number of nodes on level i of a binary tree? (5%)
 - B. What is the maximum number of nodes in a binary tree of depth k ? (5%)
6. Given a graph $G = (V, E)$ and a vertex v in $V(G)$, we wish to visit all vertices in G that are reachable from v . Write the pseudo-code of depth-first search for the problem. If we use adjacency matrix to represent G , what is the worst-case time complexity for the search? (15%)