

國立成功大學
110學年度碩士班招生考試試題

編 號： 235

系 所： 會計學系

科 目： 資料結構

日 期： 0203

節 次： 第 3 節

備 註： 不可使用計算機

※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

一、 選擇題 (50 分，每題 5 分)

1. With what data structure can dictionary be implemented most efficiently when performing "search, 'delete' and 'insert' operations?

- a) Array
- b) List
- c) Hash table
- d) Tree

2. When we use a max heap to implement a priority queue, the time complexity of the delete operations is _____.

- A. $O(\log n)$ B. $O(n)$ C. $O(n \log n)$ D. none of the above

3. When does the Segment Fault Exception occur?

- a) Compile-time
- b) Run-time

- c) Not an error
- d) Not an exception at all

4. Modern computers have memory caches, which speed up reads and writes if they are to locations near recently-accessed memory. This makes sequential access to memory faster, in general, than random access. Which of the sorting algorithms below you would expect to benefit least from caching?

- a) Insertion sort
- b) Mergesort
- c) Quicksort
- d) Heapsort

5. A pointer points to a location in memory, and obtaining the value stored at that location is known as _____ the pointer.

- A. disengage B. dereferencing C. disembarking D. none of the above

6. The average time complexity for sorting n numbers using the quick sort algorithm is _____.
- A. $O(n^2)$ B. $O(n \log n)$ C. $O(n)$ D. $O(n^2 \log n)$
7. A stack follows a _____ rule.
- A. LIFO B. fair stay C. FILO D. FIFO
8. Which of the following is *not* the required condition for binary search algorithm?
- A. The list must be sorted
- B. It should be able to directly access the middle element in any sublist.
- C. There must be mechanism to create new element in list
- D. none of above
9. Which data structure does not keep its elements in any type of order?
- A. set B. queue C. list D. stack

10. In a min-heap, element with the least key is always in which node?

- a) Leaf node
- b) First node of left sub tree
- c) root node
- d) First node of right sub tree

2. 問答題 (50 分)

1. (20) Explain the following terms.

- a) Method overloading
- b) Prefix code
- c) Polymorphism
- d) AVL tree

2. (15) Show the results of adding the following numbers into an initially empty balanced binary search tree:

13, 3, 4, 12, 14, 10, 5, 1, 8, 2, 7, 9, 11, 6, 18

3. (15) Consider the following binary search tree method.

```
public Key mystery(Key key) {
```

```
    Node best = mystery(root, key, null);
```

```
    if (best == null) return null;

    return best.key;
}

private Node mystery(Node x, Key key, Node best) {
    if (x == null) return best;

    int cmp = key.compareTo(x.key);

    if (cmp < 0) return mystery(x.left, key, x);

    else if (cmp > 0) return mystery(x.right, key, best);

    else return x;
}
```

- (a) What does `mystery(key)` return. Assume `key` is a data type value of the specified type and not null. Circle the best answer.
- A. Predecessor: the largest key in the symbol table $<$ the search key?
 - B. Floor: the smallest key in the symbol table \leq the search key?
 - C. Ceiling: the smallest key in the symbol table \geq the search key?
 - D. Successor: the smallest key in the symbol table $>$ the search key?

E. Get: the key in the symbol table equal to the search key if it's there; null otherwise.

F. Bad code: Null pointer exception or infinite loop on some inputs.

(b) What is the worst-case number of compares for `mystery()`? Assume that the BST is balanced. Choose the best answer.

1 $\log N$ N N^2 2^N