

Course no : SWE 3405

College of Engineering

Student No: \_\_\_\_\_

Course title: Data structure

**final Exam**

Student Name: \_\_\_\_\_

Exam Time: **2 Hour**

**1<sup>st</sup> Semester 2014/2015**

**Date: 11.01.2015**

No of Questions:

**Total Grade: 100**

**Try to Answer All Questions**

Open Book: **No**

**Using Computer: No**

**Using Calculator: No**

**First Question ()**

State whether each of the following is *true* or *false*.

1. The correct choice of data structure allows major improvements in program Efficiency. ( )
2. A data structure is the organization of data in a computer' s memory or in a disk file. ( )
3. In Java, an algorithm is usually implemented by a class method. ( )
4. A binary search can be applied to an ordered array. ( )
5. Linear searches don't require time proportional to the number of items in an array. ( )
6. Sorting involves comparing the keys of data items in the array and moving the items (actually, references to the items) around until they' re in sorted order. ( )
7. The bubble sort is the least efficient, but the simplest, sort. ( )
8. A queue allows access to the first item that was inserted. ( )
9. A stack allows access to the last item inserted. ( )
10. Each Link object contains data and a reference, often called next, to the next link in the list. ( )
11. A double-ended list allows insertion at the end of the list. ( )
12. A doubly linked list permits backward traversal and deletion from the end of the list. ( )
13. A new link can be inserted before or after a link with a specified key value, following a traversal to find this link. ( )
14. A double-ended list maintains a pointer to the last link in the list, often called last, as well as to the first. ( )
15. Some values of its arguments don't cause a recursive method to return without calling itself. This is called the base case. ( )
16. A recursive approach may be inefficient. If so, it can sometimes be replaced with a simple loop or a stack-based approach. ( )
17. A recursive method calls itself repeatedly, with different argument values each time. ( )
18. Both triangular numbers and factorials can't be calculated using either a recursive method or a simple loop. ( )
19. Edges are most commonly represented in a program by references to a node' s children (and sometimes to its parent). ( )
20. Graphs can represent many real-world entities, including airline routes, electrical circuits, and job scheduling. ( )

## Second Question(0)

### **Choose the best Answer:**

- 1) **Inserting an item into an unordered array**
  - a. takes time proportional to the size of the array.
  - b. requires multiple comparisons.
  - c. requires shifting other items to make room.
  - d. takes the same time no matter how many items there are.
  
- 2) **If class A is going to use class B for something, then**
  - a. class A's methods should be easy to understand.
  - b. it's preferable if class B communicates with the program's user.
  - c. the more complex operations should be placed in class A.
  - d. the more work that class B can do, the better.
  
- 3) **The maximum number of elements that must be examined to complete a binary search in an array of 200 elements is**
  - a. 200.
  - b. 8.
  - c. 1.
  - d. 13.
  
- 4) **Ordered arrays, compared with unordered arrays, are**
  - a. much quicker at deletion.
  - b. quicker at insertion.
  - c. quicker to create.
  - d. quicker at searching
  
- 5) **A binary tree is a search tree if**
  - a. every non-leaf node has children whose key values are less than (or equal to) the parent.
  - b. every left child has a key less than the parent and every right child has a key greater than (or equal to) the parent.
  - c. in the path from the root to every leaf node, the key of each node is greater than (or equal to) the key of its parent.
  - d. a node can have a maximum of two children.
  
- 6) **A subtree of a binary tree always has**
  - a. a root that is a child of the main tree's root.
  - b. a root unconnected to the main tree's root.
  - c. fewer nodes than the main tree.
  - d. a sibling with the same number of nodes.
  
- 7) **Suppose you push 10, 20, 30, and 40 onto the stack. Then you pop three items. Which one is left on the stack?**
  - a. 40
  - b. 10
  - c. 20
  - d. 30

- 8) **Suppose you insert 15, 25, 35, and 45 into a queue. Then you remove three items. Which one is left?**
- 45
  - 35
  - 15
  - 25
- 9) **Rearranging the contents of a data structure into a certain order is called**
- Searching
  - Sorting.
  - Swapping.
  - None of the above.
- 10) **When you create a reference to a link in a linked list, it**
- must refer to the first link.
  - must refer to the link pointed to by current.
  - must refer to the link pointed to by next.
  - can refer to any link you want.
- 11) **In the recFind() method in the binarySearch.java program (Listing 6.3), what takes the place of the loop in the non-recursive version?**
- the recFind() method
  - arguments to recFind()
  - recursive calls to recFind()
  - the call from main() to recFind()
- 12) **The bubble sort algorithm alternates between**
- comparing and swapping.
  - moving and copying.
  - moving and comparing.
  - copying and comparing.
- 13) **Computer sorting algorithms are more limited than humans in that**
- humans are better at inventing new algorithms.
  - computers can handle only a fixed amount of data.
  - humans know what to sort, whereas computers need to be told.
  - computers can compare only two things at a time.
- 14) **The disadvantage of mergesort is that**
- it is not recursive.
  - it uses more memory.
  - although faster than the insertion sort, it is much slower than quicksort.
  - it is complicated to implement.

**15) Finding a node in a binary search tree involves going from node to node, asking**

- a. how big the node's key is in relation to the search key.
- b. how big the node's key is compared to its right or left children.
- c. what leaf node we want to reach.
- d. what level we are on.

**Third Question(2)**

What is the Difference between each of the following terms, Justify with drawing if possible:

- 1) Pop() Method Vs Top() Method
- 2) Singly Linked Lists Vs Duple Linked Lists

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**Fourth Question(2)**

Sort the sequence 3, 1, 4, 1, 5, 9, 2, 6, 5 using insertion sort.

Insertion new node in the Middle of a Doubly Linked List between BWI and JFK



**Fifth Question(2)**

Removal PVD node form the Middle of a Doubly Linked List



**sixth Question(2)**

Write Public method **insetElement** that insert element to order array using insertion sort.