Ch 10 - - - - - - - - Trees

14

/ \

2 11

/ \ / \

1 3 10 30

/ /

7 40

1. There is a tree at the top of this section. How many leaves does it have ?

A. 2

B. 4

C. 6

D. 8

E. 9

2. There is a tree at the top of this section. How many of the nodes have at least one sibling ?

A. 5

B. 6

C. 7

D. 8

E. 9

4. There is a tree at the top of this section. How many descendants does the root have ?

A. 0

B. 2

C. 4

D. 8

5. There is a tree at the top of this section. What is the depth of the tree ?

A. 2

B. 3

C. 4

D. 8

E. 9

7. Consider the binary tree at the top of this section. Which statement 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.

9. What is the minimum number of nodes in a complete binary tree with depth 3?

A. 3

B. 4

C. 8

D. 11

E. 15

14. Consider the node of a complete binary tree whose value is stored in data[i] for an array implementation. If this node has a right child, where will the right child's value be stored?

A. data[i+1]

B. data[i+2]

C. data[2\*i + 1]

D. data[2\*i + 2]

15. How many recursive calls usually occur in the implementation of the tree\_clear function for a binary tree ?

A. 0

B. 1

C. 2

16. Suppose that a binary taxonomy tree includes 8 animals. What is the minimum number of NONLEAF nodes in the tree?

A. 1

B. 3

C. 5

D. 7

E. 8

Ch 12 - - - - - - - - - Searching

1. What is the worst-case time for serial search finding a single item in an array?

A. Constant time

B. Logarithmic time

C. Linear time

D. Quadratic time

2. What is the worst-case time for binary search finding a single item in an array?

A. Constant time

B. Logarithmic time

C. Linear time

D. Quadratic time

4. What is the best definition of a collision in a hash table

A. Two entries are identical except for their keys.

B. Two entries with different data have the exact same key.

C. Two entries with different keys have the same exact hash value.

D. Two entries with the exact same key have different hash values.

5. Which guideline is NOT suggested from from empirical or theoretical studies of hash tables:

A. Hash table size should be the product of two primes.

B. Hash table size should be the upper of a pair of twin primes.

C. Hash table size should have the form 4K+3 for some K.

D. Hash table size should not be too near a power of two.

7. What kind of initialization needs to be done for an open-address hash table?

A. None.

B. The key at each array location must be initialized.

C. The head pointer of each chain must be set to NULL.

D. Both B and C must be carried out.

8. What kind of initialization needs to be done for an chained hash table?

A. None.

B. The key at each array location must be initialized.

C. The head pointer of each chain must be set to NULL.

D. Both B and C must be carried out.

10. Suppose you place m items in a hash table with an array size of s. What is the correct formula for the load factor ?

A. s + m

B. s - m

C. m - s

D. m \* s

Ch. 13 - - - - - Sorting

In a selectionsort of n elements, how many times is the swap function called in the complete execution of the algorithm?

A. 1

B. n - 1

C. n log n

D. n²

3. Suppose that a selectionsort of 100 items has completed 42 iterations of the main loop. How many items are now guaranteed to be in their final spot (never to be moved again)?

A. 21

B. 41

C. 42

D. 43

5. Suppose we are sorting an array of eight integers using a some quadratic sorting algorithm. After four iterations of the algorithm's main loop, the array elements are ordered as shown here:

2 4 5 7 8 1 3 6

Which statement is correct? (Note: Our selectionsort picks largest items first.)

A. The algorithm might be either selectionsort or insertionsort.

B. The algorithm might be selectionsort, but it is not insertionsort.

C. The algorithm is not selectionsort, but it might be insertionsort.

D. The algorithm is neither selectionsort nor insertionsort.

6. When is insertionsort a good choice for sorting an array?

A. Each component of the array requires a large amount of memory.

B. Each component of the array requires a small amount of memory.

C. The array has only a few items out of place.

D. The processor speed is fast.

7. What is the worst-case time for mergesort to sort an array of n elements?

A. O(log n)

B. O(n)

C. O(n log n)

D. O(n²)

9. Mergesort makes two recursive calls. Which statement is true after these recursive calls finish, but before the merge step?

A. The array elements form a heap.

B. Elements in each half of the array are sorted amongst themselves.

C. Elements in the first half of the array are less than or equal to elements in the second half of the array.

D. None of the above.

10. Suppose we are sorting an array of eight integers using quicksort, and we have just finished the first partitioning with the array looking like this: 2 5 1 7 9 12 11 10

Which statement is correct?

A. The pivot could be either the 7 or the 9.

B. The pivot could be the 7, but it is not the 9.

C. The pivot is not the 7, but it could be the 9.

D. Neither the 7 nor the 9 is the pivot.

11. What is the worst-case time for heapsort to sort an array of n elements?

A. O(log n)

B. O(n)

C. O(n log n)

D. O(n²)

12. Suppose we are sorting an array of eight integers using heapsort, and we have just finished one of the reheapifications downward. The array now looks like this: 6 4 5 1 2 7 8

How many reheapifications downward have been performed so far?

A. 1

B. 2

C. 3 or 4

D. 5 or 6

Ch 14 - - - - - - - Software Reuse

What C++ syntax is used to declare that a class B is derived from class A ?

A. class A derives B { ... };

B. class B from A { ... };

C. class B : public A { ... };

D. class B subclass of A { ... };

2. If a class B is derived from A, then which of the following terms describes A ?

A. ancestor class.

B. base class.

C. parent class.

D. superclass.

E. All of the above.

4. Consider the assignment statement a=b; (with the variable declarations at the top of this section). Which answer is true?

A. The assignment statement is illegal.

B. The assignment statement activates the A assignment operator.

C. The assignment statement activates the B assignment operator.

D. The assignment statement activates both A and B assignment operators.

5. Consider the assignment statement b=a; (with the variable declarations at the top of this section). Which answer is true A. The assignment statement is illegal.

B. The assignment statement activates the A assignment operator.

C. The assignment statement activates the B assignment operator.

D. The assignment statement activates both A and B assignment operators.

6. What is the term used to describe the situation when a derived class provides a function already provided in the base class

A. Inheriting.

B. Overriding.

7. Consider the declarations at the top of this section. Suppose there are two functions: f has an argument of type A and g has an argument of type B. Which statement is correct A. Both f(b) and g(b) are legal function calls.

B. f(b) is legal, but g(b) is not legal.

C. f(b) is not legal, but g(b) is legal.

D. Neither f(b) nor g(b) is a legal function function call.

8. Consider the declarations at the top of this section. Suppose there are two functions: f has an argument of type A and g has an argument of type B. Which statement is correct

A. Both f(a) and g(a) are legal function calls.

B. f(a) is legal, but g(a) is not legal.

C. f(a) is not legal, but g(a) is legal.

D. Neither f(a) nor g(a) is a legal function function call.

9. Suppose you were going to quickly implement a Stack class. What class would be the best base class?

A. Bag.

B. List.

C. Queue.

D. Table.

Ch 15 - - - - - - - Graphs

1. Which of the following statements is true?

A. A graph can drawn on paper in only one way.

B. Graph vertices may be linked in any manner.

C. A graph must have at least one vertex.

D. A graph must have at least one edge.

2. Suppose you have a game with 5 coins in a row and each coin can be heads or tails. What number of vertices might you expect to find in the state graph?

A. 7

B. 10

C. 25

D. 32

4. 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.

5. Suppose you have a directed graph representing all the flights that an airline flies. What algorithm might be used to find the best sequence of connections from one city to another?

A. Breadth first search.

B. Depth first search.

C. A cycle-finding algorithm.

D. A shortest-path algorithm.

6. If G is an directed graph with 20 vertices, how many boolean values will be needed to represent G using an adjacency matrix? A. 20

B. 40

C. 200

D. 400

7. How many linked lists are used to represent a graph with n nodes and m edges, when using an edge list representation?

A. m

B. n

C. m + n

D. m\*n

8. How are loops represented in an edge-list representation of a graph?

A. A vertex will be on its own edge-list.

B. The edge-list will be a circular linked list.

C. The edge-list will be empty for that particular vertex.

D. The edge-list will be full for that particular vertex.

9. What is the expected number of operations needed to loop through all the edges terminating at a particular vertex given an adjacency matrix representation of the graph? (Assume n vertices are in the graph and m edges terminate at the desired node.) A. O(m)

B. O(n)

C. O(m²)

D. O(n²)

10. What graph traversal algorithm uses a queue to keep track of vertices which need to be processed?

A. Breadth-first search.

B. Depth-first search.