

1. The efficiency of inserting into an ideally balanced binary tree is big-O of:
Log2 n
2. The efficiency of a lookup into an ideally balanced binary tree is big-O of:
Log2 n
3. The efficiency of a remove from an ideally balanced binary tree is big-O of:
Log2 n
4. T or F: The Tree of hw7 is an example of a polymorphic generic container.
T
5. T or F: The Tree of hw8 is an example of a polymorphic generic container.
T
6. T or F: A tree is a container object composed of 0 or more nodes.
T
7. What is the name of the first node in a tree?
root
8. What are the names of the two node pointers that point downward serving as the infrastructure of a binary tree?
Left and right
9. What is the name of the one optional pointer that points upward in a tree?
parent
10. T or F: In a binary search tree, smaller items to left.
T
11. T or F: In a binary search tree, smaller items to right.
F
12. How many children can a node in a binary tree have?
Zero one or two
13. A binary tree is so named due to what data fields?
Left and right
14. In any non-empty binary tree, how many nodes exist without a parent?
1
15. What is the term for the node that is the entry point into a tree?
root
16. What is the term for nodes that share the same parent in a tree?
Siblings
17. What is the term for a node in a search path that follows from an ancestor?
descendant
18. What is the term for a node in a search path that terminates with a descendant?
Ancestor
19. As discussed in class, how did we compute the height of a node in a tree?
1+height of the tallest child, zero leaf
20. What is the term for a node in a tree that has no children?
leaf
21. What is the term for the nodes visited from root to a leaf in search of an item in a tree?
Search path
22. What is the term for visiting all nodes in a tree?
Traverse
23. What are the three types of tree traversals discussed in class?
In-order preorder post

24. If inserting the alphabet from a to z into a binary search tree of hw7, the resultant tree would resemble what other data structure?

A linked list

25. If inserting the alphabet from z to a into a binary search tree of hw7, the resultant tree would resemble what other data structure?

A linked list

26. What is the number of nodes to check for an unsuccessful search into an optimally balanced binary search tree of 15 items?

4

27. What is the number of nodes to check for an unsuccessful search into an optimally balanced binary search tree of 7 items?

3

28. What is the number of nodes to check for an unsuccessful search into an optimally balanced binary search tree of 31 items?

5

29. What is the number of nodes to check for an unsuccessful search into an optimally balanced binary search tree of $(2^{31})-1$ items?

31

30. T or F: With a successful "lazy" remove, the height of all nodes along the search path decrease by one to correctly describe the resultant tree.

F

31. T or F: With a successful "lazy" remove, the height of all nodes along the search path are unchanged in the resultant tree.

T

32. T or F: With a successful "lazy" remove, the balance of all nodes along the search path decrease by one to correctly describe the resultant tree.

F

33. T or F: With a successful "lazy" remove, the balance of all nodes along the search path are unchanged in the resultant tree.

T

34. T or F: With a successful "lazy" remove, the removed node is present in the tree, but the name of the item stored there is cleared.

F

35. T or F: With a successful "lazy" remove, the removed node is displayed to the user when displaying the tree to the user.

F

36. As discussed in class, how did we compute the balance of a node in a tree?

Left - right height; -1 for non-existent

37. What is the term for the action to take when at a node when traversing a tree?

visit

38. Order the following items in a pre-order traversal: A. go left, B. go right, C. visit

CAB

39. Order the following items in a in-order traversal: A. go left, B. go right, C. visit

ACB

40. Order the following items in a post-order traversal: A. go left, B. go right, C. visit

ABC

41. T or F: Spindly trees are preferable to bushy trees

F

42. T or F: Bushy trees are preferable to spindly trees

T

43. What is the term for a method that calls itself?

recursion

44. What is the term for a method that calls itself only from the end of a method?

Tail recursion

45. Select the best word: loop _____ recursion. OR OF

OR

46. T or F: A recursive solution usually involves less code than a loop based solution.

T

47. T or F: A recursive solution usually involves more code than a loop based solution.

F

48. When a program overflows the Run-Time Stack, what is the typically cause?

Infinite recursion

49. T or F: infinite recursion is one cause of an infinite loop.

F

50. What is the term for the address in the text section of memory where execution resumes when a function call completes?

Return address

51. T or F: Before a function execution begins, the address of the next instruction is pushed on the RTS.

T

52. T or F: With recursion, the return address is comingled with parameters and local variables on the RTS.

T

53. T or F: Parameters are distinct from the original variable that is passed to a function call.

T

54. Local variables are created in what section of memory?

RTS

55. T or F: With recursion, each local variable exists multiple times, one copy for each recursive call.

T

56. T or F: In designing a recursive solution, code to avoid the recursive call must be part of the solution.

T

57. T or F: With recursion, each local variable exists once with values updated automatically when returning from each recursive call.

F

58. What is the cause of the run time error that occurs with infinite recursion?

Stack overflow

59. T or F: A loop based solution often uses less memory than a recursive solution.

T

60. T or F: A loop based solution often uses more memory than a recursive solution.

F

61. T or F: A loop based solution often uses the same amount of memory than a recursive solution.

F

62. T or F: When displaying a stack track, debuggers use the return addresses on the RTS to list the line numbers in the file of the method called.

T

63. T or F: Parameters act like local variables initialized by the calling method.

T

64. If your code overwrites a RTS array overwriting return addresses, what can't your program do?
Return, display stack trace.

65. T or F: RTS memory allocation is more efficient than heap memory allocation.

T

66. T or F: Heap memory allocation is more efficient than RTS memory allocation.

F

67. What happens when a valid function pointer is stored into the PC (program counter).
Program counter-CPU address of instruction to be executed.
Func starts to execute

68. What happens when a valid return address is stored into the PC (program counter).
Func returns

69. T or F: When a function is called, the RTS stack pointer is reset allocating all parameters and all local variables for that function.

T

70. T or F: When a function returns, the RTS stack pointer is reset deallocating all parameters and all local variables for that function.

T

71. If the same named tree method exists in both the Tree and the TreeNode classes, is the implementation more likely to be loop based or recursive?
recursive

72. If a named tree method exists in only the Tree class and not in the TreeNode class, is the implementation more likely to be loop based or recursive?
loop

73. When inserting a new item into a binary tree, height and balance must be updated: A. On the way down the tree. B. On the way back up the tree. C. Either on the way up or on the way down.

B

74. Is a parent pointer most likely found in a recursive or loop based implementation of a binary tree?
loop

75. UCSDStudent had to conform so that it could be inserted into the SymTab in hw6 and hw7.
Where did the constraint methods originate?

Base. some from object

76. Besides providing definitions for the virtual functions of Base, what was the other constraint for UCSDStudent that must be met so that it could be inserted into a SymTab in hw6 and hw7?

Derive from Base

77. Besides being a public derivation from Base, what were the other constraints for UCSDStudent that must be met so that it could be inserted into a SymTab in hw6 and hw7?

Provide virtual functions of Base

78. What capability did UCSDStudent attain by being a derived class from Base?
Can be inserted into the generic container

79. Is "virtual" a keyword in C++ or in Java or both?

C++

80. Is "final" a keyword in C++ or in Java or both?

Java

81. Are functions in C++ by default virtual or final?
final

82. Are methods in Java by default virtual or final?

virtual

83. What is the Java term for the equivalent to a pure virtual function in C++?

abstract

84. What is the C++ term for the equivalent to an abstract method in Java?

Pure virtual

85. T or F: Each UCSDStudent of hw6 and hw7 has a virtual table pointer inherited from Base that points to an array of function pointers pointing to the function bodies of UCSDStudent corresponding to virtual functions first declared in the Base object definition.

True

86. What can't you do using an abstract class?

Instantiate

87. Is "abstract" a keyword in C++, Java or both?

Java

88. How many abstract methods must be declared in an abstract class definition in C++? A. 0 or more, B. 1 or more.

B

89. How many of the abstract methods must be defined in a non-abstract class derived from an abstract parent? A. 0 or more, B. 1 or more, C. All of them

C

90. What is the term for the following declaration if it exists in a class definition in C++: virtual int func() = 0;

Pure virtual function

91. Use of the & symbol in a C++ declaration is declaring what kind of entity?

reference

92. A reference in C++ is _____ for a variable that exists elsewhere.

Another name

93. As discussed in class, where do references exist in memory: A. RTS, B. Data, C. Heap, D. Text, E. Any of ABCD, F. Nowhere

F

94. T or F: References in C++ must be established at the time of declaration.

T

95. T or F: References in C++ can be established at the time of declaration or afterwards within the same method.

F

96. T or F: References in C++ can be reset to refer to another variable within the same function.

F

97. T or F: References in C++ cannot be reset to refer to another variable within the same function.

T

98. T or F: References in C++ give the programmer the power of pointers without pointer syntax.

T

99. T or F: Using References in C++, the compiler enforces that the reference is not NULL.

F

100. Write Java for C++: TNode::occupancy++;

TNode.occupancy++;

101. Write C++ for Java: TNode.occupancy++;

TNode::occupancy++;

102. Write C++ for Java: class UCSDStudent extends Base {

class UCSDStudent : public Base {

103. Write Java for C++: `class UCSDStudent : public Base {`
`class UCSDStudent extends Base {`
104. As discussed in class, besides accessing static data or a static method, what is a common use of the scope resolution operator in C++?
Define a member method outside class definition
105. As discussed in class, besides defining a member method outside its class definition, what is a common use of the scope resolution operator in C++?
Accessing static data or method
106. Assuming `stu1` and `stu2` are `UCSDStudent` objects, assuming such a function exists and all code compiles, does the follow code fragment call `UCSDStudent`'s operator `==` method? `if (stu1 == stu2) {`
T
107. Assuming `stu1` and `stu2` are `UCSDStudent` pointers, assuming such a function exists and all code compiles, does the follow code fragment call `UCSDStudent`'s operator `==` method? `if (stu1 == stu2) {`
F
108. Assuming `stu1` and `stu2` are `UCSDStudent` objects, write the most equivalent code fragment using a member method: `if (stu1 == stu2) {`
`if (stu1.operator==(stu2))`
109. Assuming `stu1` and `stu2` are `UCSDStudent` objects, write the most equivalent code fragment using a non-member method: `if (stu1 == stu2) {`
`if (operator==(stu1, stu2))`
110. When there is a choice of using a member method or non-member method which is preferable: A. Member, B. Non-Member, C. Neither
A
111. Assuming `stu1` and `stu2` are `UCSDStudent` objects, assuming both a member and non-member method exists for operator `==` for `UCSDStudent`, which one is called in the following code A. Member, B. Non-member, C. Neither: `if (stu1 == stu2) {`
C
112. What is the keyword in C++ used to give non-member methods and other classes access to private data and private methods?
friend
113. T or F: When class A announces that class B is a friend, class B can directly access private fields of class A.
T
114. T or F: When class A announces that class B is a friend, class A can directly access private fields of class B.
F
115. T or F: When class A is a friend of class B, class B is also a friend of class A.
F
116. T or F: When class A is a friend of class B, class B is not necessarily a friend of class A.
T
117. T or F: An ideal for a C++ class is to have as many friends as possible.
F
118. T or F: An ideal for a C++ class is to have as few friends as possible.
T
119. What is the keyword in C++ that extends membership access to non-members?
friend

120. T or F: cin is the keyword for the command to read input from stdin.
F
121. T or F: cout is the keyword for the command to send output to stdout.
F
122. T or F: cerr is the keyword for the command to send output to stderr.
F
123. In what section of memory can you find the "cin" object?
data
124. In what section of memory can you find the "cout" object?
data
125. In what section of memory can you find the "cerr" object?
data
126. T or F: cin is a global instance of class istream.
T
127. T or F: cout is a global instance of class ostream.
T
128. T or F: cerr is a global instance of class ostream.
T
129. Write the most equivalent fragment: cout << "Hello World\n";
cout.operator<<("Hello World\n.");
130. What is the return type of all of the overloaded << methods of class ostream?
Ostream reference
131. Write the return statement most likely existing in every overloaded << method of class ostream:
Return *this;
132. Would the following described method likely be defined inside or outside of the class definition: few lines of code called frequently.
inside
133. Would the following described method likely be defined inside or outside of the class definition: secret algorithms.
outside
134. Would the following described method likely be defined inside or outside of the class definition: many lines of code called infrequently.
outside