CS 122 – Review for final

Please also look over earlier test reviews and the tests you took earlier in the term for more practice.

1. How do we write octal and hexadecimal constants in a Java program?

2. What is the difference between a static method and an instance method? When looking at a function call, how can we tell which kind it is?

3. What are the tradeoffs of using the Integer class over the int type?

4. When is it a good idea to use a do-while loop in Java?

5. Within one class, it is legal to define two methods with the same name. How does the compiler tell the difference?

6. Why is it beneficial to use StringBuilder and String.format() inside a toString() method?

7. What is the value of the Java expression 1 / 2 + 1 / 2 ?

8. Show how a for-loop can be converted into an equivalent while loop.

9. Write a static method that takes three int parameters, x, y, z. It should return the second largest number. You may assume the values are distinct.

10. Write a Java expression that obtains the fifth character of a String variable called name.

11. Write a Java expression that determines the first location of the letter 'T' in name.

12. What are the three types of errors that can occur in a computer program?

13. Give an example of a situation where using try/catch would be desirable in a Java program.

14. What is object-oriented programming? What is the alternative strategy called?

15. What do we call an object that allows us to traverse a data structure?

16. Interfaces are not required in Java. So, what is the benefit of using them?

17. Suppose we are implementing a linked list. What statements are needed to remove a node from the linked list? What special cases do you need to consider?

18. How do we tell Java to allocate space for a linked list?

19. How do you declare and allocate space for an array of 10 integers in Java?

20. What are the tradeoffs of using a linked list over an array?

21. Write a recursive function that will determine if a string is a palindrome.

22. Explain the procedure for evaluating a postfix expression. What data structure is required?

23. How can we tell if a postfix expression is valid or not?

24. For the infix expression 5 * (25 * 4 – 6) – 6 * 2, draw the corresponding binary tree, and also write the expression in prefix and postfix notation.

25. "First-in, First-out" is the philosophy of which data structure? Give an example of a common application that would use this data structure.

26. For a simple graph, how can the adjacency matrix tell us the number of edges in the graph?

27. What kind of graph has an adjacency matrix that
    a. Is not necessarily symmetric?
    b. Includes numbers other than 0 and 1?

28. How can the adjacency matrix tell us which vertex of the graph has the highest degree?

29. Draw a connected graph with 5 vertices and 6 edges. Perform a breadth-first traversal and a depth-first traversal of the vertices. You should use alphabetical order to break ties.

30. Java's Hashtable class is similar to which data type in Python? How is this data type different from an ArrayList?

31. When we declare a variable in Java, we specify its data type. How do we reconcile the fact that polymorphism possible in Java?

32. Explain why it would be necessary to call `super()` in a constructor. What does it accomplish?

33. Explain the meaning of the access specifiers `public`, `private`, and `protected`.

34. Two classes can have an "is-a" relationship or a "has-a" relationship. Which one of these pertains to inheritance? What is the name of the other relationship? Give an example of a pair of classes that would exhibit each relationship.

35. In Java, is it legal to extend a class that is defined in the API?

36. Write a grammar that defines the set of all even-length strings containing any number of a's and/or b's.

37. Suppose you are debugging a computer program, and you are tracing its execution step by step. At what point can you tell that recursion has occurred?

38. What are the two arguments we pass to Collections.sort() ?

39. Among the sorting algorithms we have seen, which ones rely on swapping elements? Which rely on shifting elements? Which is/are recursive?

40. Write a nested loop that will print the contents of a 2-D array of integers. The numbers should be printed with a field-width of 5, because they may be up to 4-digit numbers.

41. While solving the Eight Queens problem, at what point is backtracking first necessary?

42. Give an example of a problem that would take a constant amount of time no matter the size of the input.