Computer Science Contest #1112-09 Key

January 21, 2012

1) C
2) E
3) E
4) C
5) D
6) E
7) A
8) B
9) A
10) D

11) C
12) B
13) D
14) B
15) D
16) A
17) C
18) E
19) B
20) C

21) C
22) A
23) D
24) A
25) C
26) A
27) E
28) E
29) D
30) D

31) B
32) A
33) B
34) B
35) C
36) C
37) A
38) B
39) D
40) D

Note to Graders:

- All provided code segments are intended to be syntactically correct, unless otherwise stated (e.g. error is an answer). **Ignore any typographical errors.**
- Any necessary Standard Java 2 Packages are assumed to have been imported as needed.
- Assume any undefined (undeclared) variables have been defined as used.

Brief Explanations:

1. 20_{16} = 100000_2; 8_{10} = 1000_2; -> 100000000_2 -> 400_8
2. y = 23.5; y++ -> 24.5; (int)y -> 24; (int)y%3 -> 0.
3. x = 1043 -> 8 -> 9 -> 0 -> 1; but sum = 0+8+0.
4. 'A' = 65, when i is added it becomes an int, then it is cast to a char
5. the string is shrinking while the index continues to grow.
6. the value of x[2].substring(2) returns a "".
7. this is boolean math, treat && as * and || as +, then distribute the b across the parenthesis. This gives you a+ba+bc. This becomes a+bc by distributing out the a from a+ba.
8. take the difference first and then divide by 10.
9. 72 should take you to case 1, since it's 17 miles over the limit. Since there is no break, it goes down to case 2.
10. using the Constructor, we have to send up the size first, followed by the number of sides.
11. multiply the random number by side then offset it by one before you cast it.
12. the 5 indicates the set aside number of spaces, and the 2 represents the number of decimal points to go to.
13. The illegal escape characters are o, l, h, and e.
14. row 3, col 1 is the 4^{th} row and the 2^{nd} column.
15. the conditional statement of the for loop does not have to be connected to the counter, as long as there is a way to end the loop.
16. Strings are immutable
17. 12 = 1100, 48 = 110000, 60 = 111100
18. Simplify using boolean math: A&&A = A, A||1 = 1, use distribution laws. Treat && as multiplication and || as addition, 1 is true, 0 is false.
19. It is just like saying list.add(0, "...").
20. The while loop will immediately stop when the first 50 is found.
21. The % ensures that the index stays within the bounds of the array.
22. Filling up the array goes from back to front in the case of this loop
23. you are looking for modulus' of 3, 2, 0, and 1.
24. a parent class can point to a child object.
25. super() is not necessary because there is only one constructor and it is default
26. you must call super in order to use the parent method you are currently overriding
27. all numbers being add together are between 0 and 25.
28. see above.
29. make a table for each number between 1 and 9, and from there you can figure out what the outcome is.
30. see above.
31. a max heap has a parent value greater than each child value
32. a post order must visit the right child and left child before it gets the value.
33. a tree set is always in the order of the key's compareTo
34. a set will hold all unique numbers assigned to it.
35. a visualization of how a Map can work.
36. the priority queue will always remove the top of the min-heap.
37. the value is the value in the right most leaf on lowest level of the min-heap.

38 – 39. [aei] means look for one of those letters, [^aei] means the second letter cannot be that letter. If you find one of those, split on it.