

Computer Science Contest #1314-05 Key

November 09, 2013

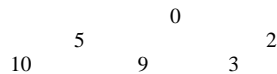
- |       |       |
|-------|-------|
| 1) C  | 21) D |
| 2) B  | 22) A |
| 3) B  | 23) A |
| 4) A  | 24) B |
| 5) E  | 25) D |
| 6) E  | 26) E |
| 7) A  | 27) A |
| 8) A  | 28) D |
| 9) C  | 29) B |
| 10) B | 30) E |
| ■     | ■     |
| 11) C | 31) B |
| 12) D | 32) C |
| 13) E | 33) A |
| 14) A | 34) D |
| 15) D | 35) B |
| 16) D | 36) C |
| 17) B | 37) B |
| 18) B | 38) A |
| 19) E | 39) C |
| 20) A | 40) C |
| ■     | ■     |

**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.  $(25^2 * 11 + 25^1 * 18 + 25^0 + 24) = 7349$   
 $(29^1 * 12 + 29^0 + 28) = 376$ ;  $376 + 7349 = 7725_{10}$
2.  $21 - 42 = -21$
3. "world"+"hello"+"." = "worldhello."
4.  $23 + 12 = 25$
5.  $\log_2 24 = 4.58$ . 4.58 rounded up is 5 + 1 from the initial counter = 6  
 Last count++ doesn't matter.
6.  $5/2$  (Integer math) = 2
7. Can be simplified to:  $(i == j) \&\& k \&\& (l == j)$ .  $(i == j) \&\& (l == j)$  cannot be set true, so the entire statement can never be set true.
8. Only num += 5 is executed. The else if is associated with the 2<sup>nd</sup> if statement. If not braces are put on if/else if statements, then only the following line is contained in the if/else if statement.
9. super() is used to call parent class constructors
10. protected String nm; private boolean veryAwkward; private int girlsAttracted; public String toString are all instance variables
11. w calls the doSomethingCool() method of Aloof and j calls the doSomethingCool() method of Awkward. Super calls in the Aloof class are done in w.doSomethingCool();
12.  $2 = 10$  and  $12 = 1100$ . XOR operator on these binary numbers = 1110 which in base 10 is 14.
13. There are no letters to capitalize in base 8. If "%o\n".toUpperCase() was changed to "%x\n".toUpperCase(), the 8e output by the new code would be changed to 8E.
14.  $7 + 8 = 15$ ; nl++ increments nl
15.  $1 + 1040 = 1041$
16.  $n(n+1) / 2$ ;  $1039 * (1039 + 1) / 2 = 540280$ ;
17. Integer and Object only work, so the answer is just Object
18.  $[0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 14, 15, 16, 18, 20, 21, 24, 27, 28, 32, 36].size() = 23$ . The answer is the size of the set of unique combinations of 0,1,2,3,4 and 0,1,2,3,4,5,6,7,8,9.
19. Math.ceil(float) does not exist
20.  $[0] > [0, 5] > [5] > [5, 4] > [5, 9, 4] > [4, 5, 9]$
21. Fibonacci-esque algorithm with Strings. Returns a + b.substring(0, b.length()-1) + integer from the 2<sup>nd</sup> recursive call;
22. See 21
23. The answer is the remainder of the division of 45.9 and 12.360
24. Primitive double is the only suitable answer. long or Object are incompatible types. Double does not work due to improper autoboxing and unboxing.
25. Double.MAX\_VALUE > Float.MAX\_VALUE > Long.MAX\_VALUE > Short.MAX\_VALUE > Byte.MAX\_VALUE
26. B and D work. B will always work because l and s will never be negative.
27. -1 because the binary search starts at index 2, so the 2 is never found.
28. Binary search because it checks the middle value and requires a sorted list
29.  $(\text{Length}2/\text{Length}1)^3$  because  $N^3$ . Therefore,  $6,660/2,220 = 3$ ,  $3^3 = 27$
30. h == t is a syntax error because you cannot compare a HashSet and a TreeSet
31. shifting a 32 bit number by 32 gives you the same answer.
32. The resulting tree is:



- Therefore the lowest leaf in the tree is 2 links away from the root
33. bp never empties, sp will always have elements, because sp will always have elements, tp will always have elements. Therefore the answer is false, false, false.
  34. Tracing shows that after the code is run, sp has 8 elements and tp has 17 elements and it can be assumed that bp also has 17 elements. Therefore,  $8+17+17 = 42$
  35. int i and j are never initialized. Syntax error.
  36. See 35
  37. In this structure, there are twice as many nth elements as (n-1)th elements with the exception of 1. For example, consider the following values added in this order to the Structure: 0, 2, 3, 4, 5. The Structure instantiates a node with value 1, 0 is added once, then 2 is added to every existing node, then 3 is added to every existing node, etc. Eventually you will see that 1 node containing 0 exists, 2 nodes containing 2 exist, 4 nodes containing 3 exist, 8 nodes containing 4 exist, and 16 nodes containing 5 exist. As more nodes are added, a relationship of  $2^n$  is maintained.
  38. Tracing required to find the answer here. IMPORTANT NOTE: you must account for the resizing of ALL the nodes (not just the root node)
  39. This is a tree because it has nodes and links between the nodes. Also, each node has multiple links to other nodes.
  40. The intent of the question was to see how many people actually read to the end of the test. No tricks here.