Computer Science Contest #1112-05 Key

November 10, 2012

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

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

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

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

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. $7D_{16}$ = 1111101, $1111101_2+11_2=10000000_2=80_{16}$.
2. --k means to remove one from k before using it, so k = 31%6 = 1.
3. 36-10 occurs before *= so the random value will be between [0,26).
4. A do…while loop will always do the body once. At that point, x ceases to be even until it goes down to 0.
5. replace does replace every occurrence of "." with "et"
6. 40 – 1 – 7 – 13 – 19 = 0. The counter is just cycling through all indexes in the list.
7. Since a plays b, b's result is superfluous. Three independent games are important: game a, game b, and game c. You cannot compare their outcomes to each other, they must be true or false on their own. This throws out C and E as a possible answer.
8. It doesn't matter what the number is, x will be assigned "Group E" because there is no break in the switch statement.
9. Before you use the multiplier, you must find the difference of the total and 20. Order of operations dictate that () be used.
10. isAlive is a private attribute and cannot be directly called from the class. The object name must be instantiated and used in the method call living.
11. Every Math method must be called Math.method(value). The sin method expects radians.
12. %o means to print the number out as an Octal (base 8).
13. \r means to return to the beginning of the current line, but only overwrite, do NOT erase.
14. The first row is 2. The second row is divided by 3. The third row is divided by 4. Add 'em all up.
15. y = 1 + 20 + 19 + 18 + 17 + 16 + 15.
16. Strings are immutable, so "pink floyd" remains "pink Floyd". Also, a substring goes up to but does not include the character of the last index.
17. 40<<3 = $40*2^3$ = 320. 157>>4 = $157/2^4$ = 9. 320 | 9 = 329 (no shared bits)
18. Boolean Algebra:

	A&&B&&!(!A&&B)||B&&C&&(!B||A)
	AB!(!AB)+BC(!B+A)
DeMorgan's Law	AB(A+!B)+BC(!B+A)
Distribution	ABA+AB!B+BC!B+BCA
	AB+0+0+ABC
Factor	AB(1+C)
1+C is 1	AB(1)
Final Answer	A&&B

19. The set command changes the current value and does not add to the size.
20. You must get the characters at 0,6,12,5,and 11 which are the remaining values when you divide the current i by the length.
21. The while loop will occur 3 times: 25->(6,18), 12->(3,9), and 6->(1,3).
22. 47 > 33 and 33 is odd.
23. The only way to get an empty String is for both values to be the same.
24. Player is an abstract class, so you cannot instantiate the Player class regardless of the existing constructor. The constructor exist solely for inheritance.
25. The add method is overload by both inheriting class and will not be used in the instantiation. The only way to use the Player add method is to call it as super.add();
26. Since Human and AI are inheriting from Player, writing a method in the Player class will be inherited by the subclasses. Writing a instance variable is fine, but if that happens, then writing a accessor AND modifier would be necessary for the subclasses to effectively use the instance variable.

27. The method will take the last digit of each number and put it in a "bucket" for the last digit. Then it will sort all the numbers in each list and put them back into the array.
28. A sort is not always in numerical order, in this case the sort was based first on the last digit and then numerically in case of collision. Putting each number in a bucket according to their digit is the key component of a radix sort.
29 & 30. The recursive statement is just printing out the string in reverse order until it gets down to the last 5 letters.
31. A long is 8 bytes, an int is 4 bytes, and a short is 2 bytes.
32. A sorted binary tree builds off itself each time a new value is entered, if the number is larger than the current node, it goes right, if it is smaller it goes left.
33. The key set is the set of the first numbers entered.
34. The remove method, removes the key from the tree.
35. The values method gives the values in the order of the keys.
36 & 37. offer means to add, poll means to remove. In queues, you add to the end and you remove from the front.
38. 31 is 11111 and 25 is 11001, when applying XOR you get 110.
39. the string must start with a b and end with an e and can have anything in between.
40. Since x starts with an "im", there will be a null value in the first index. However, it does not matter if x ends with an im.