Computer Science Contest #1415-08 Key

December 06, 2014

1)	B
2)	D
3)	E
4)	E
5)	B
6)	C
7)	A
8)	E
9)	D
10)	A
11)	D
12)	D
13)	C
14)	C
15)	E
16)	C
17)	C
18)	B
19)	A
20)	C
21)	C
22)	D
23)	A
24)	A
25)	B
26)	E
27)	D
28)	D
29)	B
30)	B
31)	E
32)	C
33)	C
34)	E
35)	E
36)	B
37)	C
38)	A
39)	1110 0010
40)	1100 1100

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. 14_{10} + $1F_{16}$ -> 1110 + 11111 -> 101101_2
2. 46321/25%25/3 -> 1852%25/3 -> 2/3 -> 0
3. %.4f means to print the value to the 4th decimal place
4. the length is 14. 14/3 = 4. charAt(4) is k.
5. && will occur before ||, so if a is true, then d will be true.
6. Math.exp(double) is a method that allows you to use e in an expression. You can have also used the answer E if you would have reversed the parameters.
7. It looks scary until you realize that Math.pow(0,anything) is zero.
8. When you compare chars, you are comparing alphabetically. The String builds throughout the loop.
9. Although x continues to increase, i is set to x only once and will continue to decay till it escapes the loop.
10. The last index that will be used is 4 and it is used to alter index 3, so the value at index 4 remains the same.
11. Here is the thing about streams, they don't know if a digit is a String or not, so the stream only sees the numbers 17 which to the nextInt means it is a viable number. Even if the stream is reading from a String, it will still see a number and not a String.
12. This loop will count the number of As, Bs, and Cs.
13. != is an equality statement, all the others are assignment statements.
14. The largest number for an byte is 0111 1111 if you double the value it is 1111 1110. However the first bit is considered a – because it is a 1. So you are really dealing with -111 1110 which is the second to last negative value. the last negative value -111 1111 is -1, so the second to last negative value is -2.
15. the run-time error occurs when the index 6 is called for and it is out of bounds.
16. since a user defined constructor is used, the default constructor is no longer available unless the user writes a default constructor.
17. The key here is that it overloads the toString method which was inherited from the Object class, so it must over load a public String toString() method.
18 and 19.

```
      Tyeee
      eahhW
      rWWTy
      eeeea
      hhWrW
```

20. The hexadecimal number will be 28 digits long and the >> means to remove the last 20 digits. So you are printing the first 8 digits which is 00100010.
21 & 22. the method appends each character to the end of the string which is its modulus location, as long as it is not the location. q, y, and e are all 0 locations, r is 1, w is 2, and t is 3.
23. A can only be an abstract class because B implements it. B can only be an abstract class because not all the abstract methods are overloaded.
24. B.getX() and B.getY() cannot be used because you are accessing a non-static method. x, y, super.x, super.y is attempting to access a private variable.
25. Because the parent class does not use a default constructor, you cannot code super() nor can you assume super() is automatic.
26. Because B is an abstract class, it cannot be instantiated even thought it has a constructor.
27. The iterator uses remove on the last next it had crossed. In this case comi was the last next and was removed.

28. m(36)=m(12)+1=4+1=5
m(12)=m(4)+1=3+1=4
m(4)=m(2)+2=1+2=3
m(2)=m(1)+2=-1+2=1
m(1)=m(1)-1=0-1=-1
m(0)=0

29. m(223)=>m(222)=>m(74)=>m(37)=>m(36)=>m(12)=>m(4)=>m(2)=>m(1)=>m(0)=9 recursive calls (you do not include the original call)

30. 53 = 00110101 and 255=11111111, 53^255=11001010=202

31. A min heap tree must be a balance tree with every parent smaller than it’s children. The tree is updated when every new value is placed on left most leaf, hence the order doesn’t matter on its level but rather on its branch from top to bottom.

32. The stack is [Say, you, hav, an, i, fol] where fol is the top, if you add(0,x) to a stack, you are putting it on the bottom. So, after one interation the stack, st, would be [ol, Say, you, hav, an, i]

33. map.contains(i) does not exsist, however map.containsKey(i) does

34. the map.values gives the values that each key points to, it is in the order of the keyset.

35. [pb].+s.+d means the string starts with a p or b, must have at least one letter before an s and must have at least one letter before the d.

36. The pointy design is a OR, the D design is an AND, the D with the circle is a NAND

37. (AB+C)((A+C)!(B+C))+C!B(A+!C)
(AB+C)(A+C)(!B!C)+C!BA+C!B!C //DeMorgan’s Law
(AB+C)(A!B!C+C!B!C)+A!BC+!BC!C
(AB+C)(A!B!C+0)+A!BC+0   //C!C = 0
(AB+C)(A!B!C)+A!BC
ABA!B!C+CA!B!C+A!BC
0+0+A!BC
A!BC

38. EAB+/ECA+/+ED/+ = E(A+B)/E(C+A)/+E/D+ = E/(A+B)E/(C+A)++E/D
= E/(A+B)+E/(C+A)+E/D

39. Use two’s compliment: 30 = 00011110, flip the bits = 11100001, add one = 11100010 = -30.

40. ((LCIRC-2(NOT(1101 AND 11001100)))XOR(RSHIFT-3(NOT(11100101))))
((LCIRC-2(NOT(0000 1100)))XOR(RSHIFT-3(00011010)))
((LCIRC-2(1111 0011))XOR(0000 0011))
((1100 1111)XOR(0000 0011))
(11001100)
11001100