Computer Science Contest #1617-04 KEY October 29, 2016

|  |  |  |  |
| --- | --- | --- | --- |
| 1) D | 21) | B |  |
| 2) A | 22) | C |
| 3) B | 23) | B |
| 4) C | 24) | D |
| 5) D | 25) | C |
| 6) C | 26) | D |
| 7) C | 27) | A |
| 8) D | 28) | D |
| 9) E | 29) | A |
| 10) B | 30) | A |
|  |  |  |
| 11) B | 31) | C |
| 12) E | 32) | B |
| 13) C | 33) | A |
| 14) E | 34) | C |
| 15) E | 35) | C |
| 16) C | 36) | A |
| 17) D | 37) | E |
| 18) B | 38) | E |
| 19) A | 39) | 1000 | 0110 |
| 20) E | 40) | 0100 | 0000 |

**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. 1111112+9310 = 1111112+10111012 = 100111002

1. although it is being held as a double value, all the mathematics is being done as integers before it is placed into a double variable.
2. %10s means to allocate 10 spaces in the print out and to print out the String on the right hand side.
3. substring uses the index from 4 up to but not including 10.
4. Here is the truth table

|  |  |  |
| --- | --- | --- |
| a | b | !a && b |
| true | true | false |
| true | false | false |
| false | true | true |
| false | false | false |

1. Math.random() will create a random value between [0,1), if you cast that immediately to an int, then it will be 0 no matter what. You must multiply the random value by a number before you cast to an int.

7. x = 2 -> y = 4 -> z = 0 -> x = -3 -> x – z + y = 1.

1. in a switch statement, you must use break; to jump out of the case or it will run through all the cases below it.
2. The output is an infinite loop of FRONT because Strings are immutable. The correct line would be s = s.substring(1);
3. list[list[list[0]]]->list[list[8]]->list[5]=2
4. next reads in a String and every one list can be considered a String
5. The first loop will be 6\*5 = 30, the next loop will be 30 \* 8 = 240. The loop will end when i = 10.
6. <http://introcs.cs.princeton.edu/java/11precedence/>This is where you can find the entire precedence list. Unary plus is looks like +5, which indicates a number is positive.
7. A short is a 2 byte integer, or 16 bits.
8. Before the last line of code you have [9, 0, 6] so that if you try to get(3) you will be out of bounds and have a run time error.
9. The only instantiation that will work requires 2 paramenters of int, and you must use new.
10. The only options from the previous instantiates are 4,7 or 0,0. 0,0 would return 0 0, so that is not an option. 4,7 becomes 8, 21 which is then divided by 6, integer division yields 1, 3.

18. i = 2, j =4, mat[6] = 3, 3%9 = 3.

19. This is the code for mirroring along the vertical column 2. 20. 244 = 11110100

193 = 11000001, | = if either bit in the column is 1 then the result is 1 11110101 = 245.

21&22. The method adds y to the smallest of the numbers at i-1 and i. It is possible that an element of the list will get increased twice.

23 – 25. count is a static, so every time it is used, it is permanently changed. super(dig) will set the parents x, not the child’s x. x = dig will set the child’s x. Because get() and toString() only is defined in the parent, it is using the parent’s x. The classes give no access to the child’s x in the current code.

1. Each movement goes down or up the area, prints the first letter and then resizes the String without that latter. This continues until one String is empty.
2. offer is the same as add() to the end, poll is the same as remove(0), and peek is the same as get(0).

28 & 29. Please notice that the base case is when x>0 and also when x is smaller than y. Only then does the recursion end and none sooner.

1. The bitwise ^ only returns one when the two bits are opposite. So 49 = 110001 and 24 = 11000 therefore you get 101001 = 41.
2. An in-order traversal will go to the left of a node and then it will print out the root, and then go to the right of a node. So the farthest left node will be printed first.
3. The key here is that st.remove(0) is not the same as pop. remove(0) removes from the bottom of the stack.
4. E is a key for A, since it was the last put command for E.
5. C is not a key for anything, so it will stop the loop.
6. The . has a meaning regex, so you can’t use that alone. So you want to use

\. However \ is an escape character in a String literal so you have to use \\ to get one \ and then pair it with a . to make it work. Hence \\. (Trust me, once you understand this, regex is a piece of cake…carrot cake maybe, but still cake)

1. The statement has A + !A in it, which means, no matter what, the statement is going to be 1, 1 is the value for true in Boolean algebra.
2. The triangle with the circle is a NOT, the D symbol is AND, and the Star Trek looking symbol is a OR.

38. (E+F-G)^2/(H-I) => (EF+G-)^2/HI- => EF+G-2^ / HI- => EF+G-2^HI-/

39. 2’s compliment: 122 is 01111010, flip the bits 10000101, and 1 for 10000110 which is -122

40. (LSHIFT-1 10110100)AND(RCIRC-4 00101100)

01101000 AND 11000010

01000000