★ANSWER KEY – CONFIDENTIAL★

UIL COMPUTER SCIENCE – 2019 INVITATIONAL B

Questions (+6 points for each correct answer, -2 points for each incorrect answer)

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

** See "Explanation" section below for alternate, acceptable answers.*

Note: Correct responses are based on **Java SE Development Kit 8 (JDK 8)** from Sun Microsystems, Inc. All provided code segments are intended to be syntactically correct, unless otherwise stated (e.g., "error" is an answer choice) and any necessary Java SE 8 Standard Packages have been imported. Ignore any typographical errors and assume any undefined variables are defined as used.

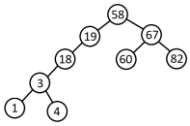
Explanations:

1.	D	$1011_2 = 11_{10} = B_{16}$ $1001_2 = 9_{10} = 9_{16}$ $10111001_2 = B9_{16}$
2.	E	29%15/3+1 = 14/3+1 = 4+1 = 5
3.	A	`\n` produces a new line. `\\` produces a backslash.
4.	A	`charAt(6)` is a 'u'. `indexOf('u')` is 1.
5.	A	T&&!T^(T||T) = T&&!T^T = T&&F^T = T&&T = T
6.	D	`Math.cbrt(64)` returns the cube root of 64 as a double.
7.	C	8.75 + (-3) = 5.75 The int is promoted to a double.
8.	B	3*8>=11+12 5-18<-14 24>=23 -13<-14 True False
9.	E	<table><tr><td>value of z</td><td>what is printed</td></tr><tr><td>-4</td><td></td></tr><tr><td>-1</td><td>-1</td></tr><tr><td>2</td><td>2</td></tr><tr><td>5</td><td>5</td></tr><tr><td>8</td><td>8</td></tr><tr><td>11</td><td>11</td></tr></table>
10.	D	<table><tr><td>9</td><td>4</td><td>-4</td><td>2</td><td>0</td><td>5</td></tr><tr><td>9</td><td>4</td><td>-4</td><td>2</td><td>8</td><td>5</td></tr><tr><td>9</td><td>4</td><td>-4</td><td>2</td><td>8</td><td>-4</td></tr></table>
11.	A	A Scanner object is needed that is linked to the datafile.dat file. Therefore, a new File object must be instantiated and passed to the Scanner class constructor.
12.	B	<table><tr><td>n</td><td>m</td><td>m/10</td></tr><tr><td>10</td><td>100</td><td>10</td></tr><tr><td>19</td><td>90</td><td>9</td></tr><tr><td>27</td><td>80</td><td>8</td></tr><tr><td>34</td><td>70</td><td>7</td></tr><tr><td>40</td><td>60</td><td>6</td></tr><tr><td>45</td><td>50</td><td>5</td></tr><tr><td>49</td><td>40</td><td>4</td></tr><tr><td>52</td><td>30</td><td>3</td></tr><tr><td>54</td><td>20</td><td>2</td></tr><tr><td>55</td><td>10</td><td>1</td></tr></table>
13.	D	++7*10>12*8+10 The value of `h` on the right-hand side of the > operator reflects the incrementation on the left-hand side. 8*10>12*8+10 80>96+10 80>106 False
14.	C	`SIZE` returns the number of bits required to store a value of type Integer. In this case 32. `BYTES` returns the number of bytes required. 8 bits makes a byte. 32/8=4.
15.	D	The get method does not remove the item from the list.
16.	C	The regular expression `[a-z]\\W\\d` will match a combination of three letters that has one lower case letter, a symbol and a digit. There are three combinations like that in the string str: "c^2", "s&8" and "y%1".
17.	E	The strings are the same until 'a' and 'd'. 'a' – 'd' = 97 – 100 = -3
18.	E	`continue` skips the remainder of the loop body. Therefore, `i` is never incremented which creates an infinite loop.
19.	A	Each value in `list` is placed into `i` with each iteration of the loop.
20.	D	Answer choice A returns a*b every time. Answer choice B contains a logic error in the if statement. Answer choice C is an infinite loop.
21.	B	List, Queue and Set are all interfaces. ArrayList does not implement Queue.
22.	C	A Queue is accessed in a first in, first out fashion.

23.	C	`peek()` does not remove elements. `poll()` and `remove()` both remove elements.

24.	A	$121_{10}=1111001_2$ and $87_{10}=1010111_2$
		`  1111001`
		`& 1010111`
		`  1010001`
		$1010001_2 = 81_{10}$

25.	D	`i  j  k`
		`1  1  0`
		`2  2  1`
		`3  2  0`
		`4  3  2`
		`5  3  1`
		`6  3  0`
		`7  4  3`
		`8  4  2`
		`9  4  1`
		`10  4  0`

26.	E	The method `sort` is a selection sort. Each pass of the inner loop is searching for the smallest value in the unsorted portion of the list.
27.	A	With each iteration of the outer loop the smallest value in the unsorted portion of the list is swapped with the first value in the unsorted portion of the list and then added to the sorted portion. Here is a print out of each iteration: i=0 [0, 9, 3, 7, 2, 1, 4] i=1 [0, 1, 3, 7, 2, 9, 4] i=2 [0, 1, 2, 7, 3, 9, 4] i=3 [0, 1, 2, 3, 7, 9, 4] i=4 [0, 1, 2, 3, 4, 9, 7] i=5 [0, 1, 2, 3, 4, 7, 9] i=6 [0, 1, 2, 3, 4, 7, 9]
28.	B	See #'s 26 and 27.
29.	E	Best, average and worst cases are all n^2.
30.	C	a&&b^c TTT = F a||b^!c TTF = T a&&b&&!c TTT = F a||b&&c TTF = T
31.	A	`this(id)` calls the overloaded constructor `Item(int id)` within the class which then assigns the value to the field `id`.
32.	D	toString methods must always return a String type object.
33.	D	`getCost()` must have a return type of double and must return the value stored in the field `cost`.
34.	C	**<code1>** has been replaced with `this(id)` which calls the second constructor which in turn increments `count` to 1. `count` is incremented again within the first constructor to become 2. Instantiating a second `Item` object with the second constructor increments `count` to 3. Instantiating a third Item object with the default constructor does not increment count again.
35.	E	Assignment operators are applied from right to left.
36.	B	Law of Union (UIL Official List of Boolean Algebra Identities)
37.	A	The `add(String s)` method does not allow duplicates.
38.	A	Answer choice B is the infix version, C is the postfix version and D is the prefix version of the same expression. A is not equal to those expressions.
39.	21	Formula to find edges is: n*(n-1)/2 7*(7-1)/2 = 21
40.	4	A leaf within a binary search tree is any node that does not have a left or right child node.  In this case, 1, 4, 60, and 82 are leaf nodes.