★ANSWER KEY – CONFIDENTIAL★

UIL COMPUTER SCIENCE – 2019 STATE

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

1) C	11) E	21) C	31) C
2) A	12) D	22) E	32) E
3) E	13) C	23) E	33) D
4) D	14) A	24) A	34) A
5) B	15) E	25) A	35) B
6) A	16) B	26) C	36) C
7) D	17) D	27) B	37) D
8) C	18) D	28) D	38) E
9) B	19) A	29) A	*39) 228
10) B	20) E	30) E	*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.	C	$133_7 = 73_{10}$ $122_8 = 74_{10}$ All other answer choices equal 73_{10}.
2.	A	-(5*-7/2+9-4)= -(-35/2+9-4)= -(-17+9-4)= -(-8-4)= -(-12)= 12
3.	E	3.25 X 12 = 39.00. The format specifier has 3 flags, - which left aligns, + which forces a plus sign for positive values and , which requires a comma separator (not used in this case). 10.3 specifies the use of 10 spaces and three decimal places.
4.	D	`indexOf('a',2)` begins to look for the character `'a'` at the index value 2. The first `'a'` in the string is found at index number 1 so that value is not returned. The next occurrence of `'a'` is at index value 6.

5.	B	`T&&!F^T||F=`
		`T&&T^T||F=`
		`T&&F||F=`
		`F||F=`
		`F`

6.	A	`Math.PI` = 3.141592653589793 `Math.E` = 2.718281828459045 `Math.floor(3.141592653589793)` = 3.0 `Math.ceil(2.718281828459045)` = 3.0 3.0 X 3.0 = 9.0

7.	D	`14+14-12*14/3=`
		`14+14-168/3=`
		`14+14-56=`
		`28-56=`
		`-28`

8.	C	`5 - -10>=-2` is true. `-2*5>0` is false. Print the 2. `-2==-10+8` is true. Print the 3. Last line is not part of the if else statement so print the 6.
9.	B	Each iteration of the inner loop prints `x` number of `^`. `x` is decremented by the outer loop from 5 down to 1.
10.	B	After second line `i` becomes: `2 4 8 6 9 11 1 3 5` After fourth line `j` becomes: `8 12 7 4 3 5 1 2 6`
11.	E	The `in` object is a reference to the default input stream. `System` has not been imported so it must be included.
12.	D	Here is the value of `v` for each iteration of the loop: 3.25 6.5 9.75 13.0 16.25 19.5 22.75 26.0

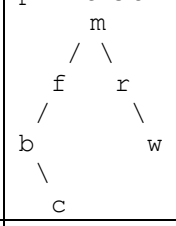
13.	C	`5^4<<3%2=`
		`5^4<<1=`
		`5^8=`
		`13`
		`158%13=2`

14.	A	`Byte.BYTES` = 1 and `Byte.SIZE` = 8. 8 + 1 = 9.

15.	E	`az` → `m r p`
		`by` → `f n d`
		`by.addAll(2,az)` means insert all of `az` into `by` starting at index 2.
		`by.addAll(2,az)` → `f n m r p d`

16.	B	Answer choice A implements the method. Abstract methods are not implemented. Answer choice C is incorrect because any class containing an abstract method must also be declared as abstract. The method in answer choice D is not abstract therefore it must be implemented (have a body).
17.	D	condition?true:false In this example the length of the string is 8 which is less than the ASCII value of 'o', which is 111, so print `s.substring(1,4)`.
18.	D	The iterator is initially placed between the O and the B. `out.print(li.next())` prints the B and moves the iterator between the B and the W. `li.next()` moves the iterator between the W and the N. The loop then prints the letters in reverse order starting at W.
19.	A	The flag `CASE_INSENSITIVE` ignores case. The flag `LITERAL` ignores all metacharacters and escape sequences. Therefore, `[abc]` is not viewed as a character class in a regular expression. The actual string `"[abc]"` must be present for a match with the exception that the characters can be both upper and lower case.
20.	E	Answer choices A and B will compile. Answer choice C will not because `Queue` does not implement `Comparable`. Answer choice D will not because primitive data types are not objects which in turn do not implement `Comparable`.
21.	C	The last line in the class makes a static reference to `SIZE`.
22.	E	`DataIterator` is an interface and can not implement any methods so it must extend `Interator`. Since `DataIterator` is an interface it must be implemented by `SpecialIterator`.
23.	E	Choices A, B and D are all valid.
24.	A	The call to the `Data` constructor fills the list array as follows: `[15, 14, 13, 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1]` `SpecialIterator` skips every other element in the array.
25.	A	An **inner class** is any class that is declared within another class. It is an instance member of the enclosing class just like instance variables and instance methods. A **local class** is defined within a block. Typically local classes are declared within a method. They are not an instance member of the enclosing class. `SpecialIterator` is not declared within a method. **Anonymous classes** are declared and instantiate at the same time and do not have a name. `SpecialIterator` clearly has a name. `SpecialIterator` is a class not an interface. `SpecialIterator` is a nested class, however, it has not been declared as static so it is not a a **nested static class**.

26.	C	`"U"+5*2+"V"+4+9=`
		`"U"+10+"V"+4+9=`
		`"U10V49"`

27.	B	Class `UIL` is a partial implementation of a binary search tree. `f` is the left child and `g` is the right child for each parent node. `m` is the root. Within the `add` method `x` is a parent node and `y` is the root of this subtree. The while loop moves down the tree searching for the proper location to add the element `e`. When the root becomes `null` the loop stops and the element is added as the appropriate child node.
28.	D	Add the new element as either the left or right child of the current parent.
29.	A	`print` is an in order traversal of the this tree: 
30.	E	See #27

31.	C	`Merge_sort` is a bottom up implementation of the merge sort algorithm. Here is a print out of each iteration of the outer loop in `sort`.
		`1 [z, e, r, b, l, a, o, i, n]`
		`2 [e, z, b, r, a, l, i, o, n]`
		`4 [b, e, r, z, a, i, l, o, n]`
		`8 [a, b, e, i, l, o, r, z, n]`

32.	E	If `j` is greater than `hi`, then there are no more elements to compare in the right half of `aux`.
33.	D	Merge sort is O(n log n) in all cases.
34.	A	`nextInt(n)` returns a random integer between 0 inclusive and n exclusive. 97 is the ASCII value of 'a'.
35.	B	Example: `mtd(1024)` returns 10. $2^{10} = 1024$. $\log_2(1024)=10$.

36.	C	`10100011 = -93`
		`10001010 = -118`
		`11011101 = -35`
		`11001101 = -51`
		`11010110 = -42`

37.	D	The expression diagrammed is !(!(A&&B)||!(A^C)). !(!(T&&T)||!(T^F))= !(!T||!T)= !(F||F)= !F= T
38.	E	$\overline{\bar{A} * (A + B) + (B + B * A)}$ $\overline{\bar{A} + \bar{B}}$ Law of absorption $\bar{\bar{A}} * \bar{\bar{B}}$ DeMorgan's law
39.	228	15 8 – 26 5 + + 43 7 / * = 7 31 + 6 * = 38 6 * = 228 The problem clearly states the integer division should be used. Do not accept an answer that is not a whole number.
40.	4	A simple cycle is a path whose first and last vertices are the same and that contains no repeated edges or vertices. In this case: 0 5 3 4 6 0 0 5 4 6 0 3 4 5 3 9 11 12 9