★ANSWER KEY – CONFIDENTIAL★

UIL COMPUTER SCIENCE – 2017 REGION

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

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

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. B $100_8=64_{10}$, $40_{16}=64_{10}$, $01001000_2=72_{10}$, $98_{16}=152_{10}$, $01000000_2=64_{10}$
2. E $8+5\%4-3.0 = 8+1-3.0 = 9-3.0 = 6.0$
3. E `%12.2f` means a decimal number, right justified in 12 spaces and rounded to two decimal places.
4. C `s.substring(0, 1)` returns a **g**. `s.substring(s.length()-1)` returns a **t**. Therefore, we are going to replace all of the g's with t's.
5. B

a	b	c	d	a||b&&c^d
F	F	T	F	F
T	F	F	F	T
F	T	T	T	F

6. E Math.round returns a long which can not be assigned to an int type variable.
7. C m is decremented **before** it is multiplied times n. n is incremented **after** the multiplication. The result of the multiplication is 32.832. Casting to an int then truncates the result to 32 which is then promoted back to a double with assignment leaving 32.00.
8. D When a switch statement encounters an empty case statement it will fall through to the next case statement. The values for x are 1, 2, 3, 5 then 6.
9. E Begins with the last letter in the string (`i=s.length()-1`), moves backwards printing every other letter (`i-=2`). Stops before the first letter (`i>0`).
10. C The for loop takes each value in the array `a`, starting at the back, and places it into array `b`, starting at the back, but stops before the zero (0) index is reached therefore `b[0]` is unassigned. The default value is 0 (zero).
11. A The Scanner method next() returns a String which cannot be added to or assigned to a double type variable.
12. D Answer A creates an inaccurate count of the values because b is initialized to 1. Answer B never increments variable b. In answer C, variable b finds the sum of the values instead of the count.
13. C Subtraction comes before bit shifting in the order of operations. >> is division by a power of 2. 16>>4-2 = 16>>2 = $16/2^2$ = 16/4 = 4.
14. A Add one (1) and change the sign.
15. D The set method **replaces** the element at the specified position.
16. E Any class that contains an abstract method must also be abstract.
17. B The odometer field is a private field within the Vehicle class and can not be directly access from within the Electric class.
18. B The default Gas class constructor does not make an explicit call to a super constructor. Therefore, there is an implicit call to the default Vehicle constructor before the output statement is executed.
19. D Objects may not be instantiated from abstract classes.
20. E The method charge() is undefined for the type Vehicle.
21. C Match any capital letter once followed by any lower case letter one or more times followed by a comma then a space followed by any capital letter once followed by any lower case letter one or more times.
22. A Elements in a Map are stored in ascending order of the key values, in this case, locker numbers.
23. E The put method replaces the value for that key. The get method returns the value associated with the designated key but does not remove it.
24. D The code finds the product of matrices a and b.

25. D   s2 contains [fil, , ditproj, ct]

0	1	2	3
"fil"	""	"ditproj"	"ct"

26. B   All classes inherit from the Object class. Object is the cosmic super class.
27. D   While it is counter intuitive to sort a Stack, any class that implements the List interface may be sorted using Collections.sort.
28. C   Merging is the last step in the algorithm.
29. E
30. E   The merge sort has O(n log n) complexity in all situations, best, worst, and average.
31. A   Determines if x is even or odd. Answer choice A is an illustration of the call stack where # is the bottom and ^ is on top.
32. B   The values of m and n never change in the client code because they are passed by value to the method.
     m=20 n=2 c=22 d=40
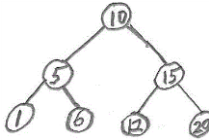   m=22 n=3 c=22 d=37
     m=25 n=4 c=22 d=33
     m=29 n=5 c=22 d=28
     m=34 n=6 c=22 d=22
     84 20 2
33. C   Preorder traversal visits node, left then right.

34. D   Same as:
```
int x;
if(s1.length()>s2.length())
        x=s1.length();
else
        x=s1.length();
```
35. A   Bit shift before bitwise AND. 5*8/4=10. 10&17=0.

```
    0   1   0   1   0
&   1   0   0   0   1
    0   0   0   0   0
```

36. E   * is AND, ⊕ is XOR, and the over bar means NOT. Same as A & !B ^ C.
37. C

10101101	11011001	11111111	00000101	00010011
-83	-39	-1	5	19

38. B   C contains the correct number of edges but they connect to different nodes. D contains to many edges. A is a directed graph and would have half as many connections. Therefore, C is correct.
39. Also accept A || !(B && C); A or not (B and C); A|!(B&C); !(B&&C)||A; !(C&&B) || A; A|!(BC).
40. Linked lists do not allow for direct access via an index, so O(n).