★ANSWER KEY – CONFIDENTIAL★

UIL COMPUTER SCIENCE – 2017 INVITATIONAL A

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

1) A	11) B	21) E	31) A
2) D	12) A	22) B	32) B
3) A	13) E	23) A	33) C
4) E	14) E	24) D	34) D
5) A	15) C	25) C	35) A
6) A	16) D	26) B	36) D
7) B	17) B	27) E	37) E
8) E	18) C	28) C	38) C
9) C	19) D	29) D	*39) 4
10) A	20) A	30) D	*40) 10100101

** 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. A 64 + 16 + 8 + 4 + 1 = 93
2. D 15-10/5+8*2 = 15-2+16 = 13+16 =29
3. A The escape sequences \" and \\ force a quote and a backslash into the output.
4. E toUppercase() makes ALL characters uppercase.
5. A true&&false||true = false||true = true. and comes before or in the order of operations.
6. A ceil finds the next largest whole number and returns it as a double type value.
7. B 2.2*8 = 17.6. Variable o is of type double so the decimal is preserved.
8. E Both conditions for the if statements are true, therefore both assignment statements are executed.
9. C Variable x starts at 1 and ends at 6. 1, 2, 3, 4, 5, 6 asterisks.
10. A Default values for int arrays is zero and the length is fixed when the array is created.
11. B get() is not a method in the Scanner class. nextLine() will read all of the words at once so they would all be printed on the same line. next() will read the words one at a time.
12. A 4 + 5 + 6 + 7 + 8 + 9 = 39
13. E Since the increment operator comes before the variable m in the expression one is added to m **before** the assignment is made. 8 + 2 – 6 = 4. However, o is decremented **after** the print statement executes.
14. E The range of values that can be stored in a short variable is -32768 to 32767.
15. C The size of a newly instantiated ArrayList is zero. The remove(x) method removes the element at index value x.
16. D When the delimiter for the split method starts a string (in this case "a"), an additional element that contains an empty string is placed into the array at index value 0.
17. B The Stack data structure uses a first in, last out model. New Mexico and Louisiana are popped out. Stacks do allow duplicates.
18. C 6 + 4 + 2 + 10 = 22
19. D As long as one operand is double the result will be double.
20. A Each corresponding entry of the two matrices are added. Simple matrix addition.
21. E The return type of a method much match the type of the value that is returned by the code. temp is double therefore sum must be double.
22. B The default constructor sets x and y to zero. Class B inherits the add method from class A.
23. A Since B extends A, all are true.
24. D Fields x and y are public, therefore they can be access by any object of type A or B. The line B b1=new B(); will not compile.
25. C s1 and s2 point to the **same** string constant but s3 points to a different string that contains the same characters.
26. B The regular expression "B\\D+" matches any string that starts with a capital B and is followed by one or more non-digit (anything but 0-9) characters. "Bill" is the only string that meets those conditions.
27. E
28. C After two passes through the while loop, Rob is the middle element.
29. D
30. D Math.random() returns a decimal value x such that 0<=x<1. Casting truncates, so the value can never be 5.

```
w  x  y  z
0  0  0  10
4  4  1  -1
8  4  3  -1
13 4  5  -1
20 4  7  -1
23 3  1  -1
26 3  3  -1
31 3  5  -1
38 3  7  -1
40 2  1  -1
43 2  3  -1
48 2  5  -1
55 2  7  -1
56 1  1  -1
59 1  3  -1
64 1  5  -1
71 1  7  -1
71 0  9  -1
```

31. A
32. B Primitive variables are passed by value. Therefore, any changes made to a and b within the method are not seen in the client code.
33. C A queue uses a first in, first out model for removal.
34. D The first element added to a binary tree becomes the root node. Everything to the left of the root node must be less than the root and everything to the right must be greater than the root. Each sub tree must follow the same rule.
35. A A leaf is any node that does not contain any child nodes.
36. D Nodes that are adjacent are connected by one edge.
37. E  is and.  is not.  is or.
38. C

$$
\begin{aligned}
(A+B)(A+C) &= AA+AC+AB+BC \\
&= A+AC+AB+BC \\
&= A(1+C+B)+BC \\
&= A \cdot 1+BC \\
&= A+BC
\end{aligned}
$$

39. 4 The infix version of this expression would be (28-4*3)/((6+6)/3) = 4.
40. 10100101 Write down the binary equivalent of 91. 01011011. Take the complement (flip the bits). 10100100. Add one to the complement. 10100101.