

# ★ ANSWER KEY – CONFIDENTIAL ★

## UIL COMPUTER SCIENCE – 2019 INVITATIONAL A

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

- |                  |                  |                  |                        |
|------------------|------------------|------------------|------------------------|
| 1) <u>  E  </u>  | 11) <u>  E  </u> | 21) <u>  D  </u> | 31) <u>  A  </u>       |
| 2) <u>  A  </u>  | 12) <u>  C  </u> | 22) <u>  B  </u> | 32) <u>  C  </u>       |
| 3) <u>  C  </u>  | 13) <u>  A  </u> | 23) <u>  A  </u> | 33) <u>  D  </u>       |
| 4) <u>  B  </u>  | 14) <u>  D  </u> | 24) <u>  D  </u> | 34) <u>  B  </u>       |
| 5) <u>  C  </u>  | 15) <u>  B  </u> | 25) <u>  C  </u> | 35) <u>  E  </u>       |
| 6) <u>  D  </u>  | 16) <u>  E  </u> | 26) <u>  E  </u> | 36) <u>  B  </u>       |
| 7) <u>  A  </u>  | 17) <u>  C  </u> | 27) <u>  B  </u> | 37) <u>  C  </u>       |
| 8) <u>  E  </u>  | 18) <u>  E  </u> | 28) <u>  E  </u> | 38) <u>  A  </u>       |
| 9) <u>  B  </u>  | 19) <u>  A  </u> | 29) <u>  A  </u> | *39) <u>    9    </u>  |
| 10) <u>  B  </u> | 20) <u>  B  </u> | 30) <u>  B  </u> | *40) <u> 10100110 </u> |

\* 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.	E	A <sub>16</sub> =10 <sub>10</sub> B <sub>16</sub> =11 <sub>10</sub> 11*1=11 10*16=160 2*256=512 11+160+512=683																		
2.	A	45*8*2/3+-6 = 45-16/3-6 = 45-5-6 = 40-6 = 34																		
3.	C	println moves the cursor to the next line. print does not.																		
4.	B	String index values start at 0. <table border="1"><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr><tr><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td></tr></table> str.substring(4) returns efgh str.substring(1, 3) returns bc			0	1	2	3	4	5	6	7	a	b	c	d	e	f	g	h
0	1	2	3	4	5	6	7													
a	b	c	d	e	f	g	h													
5.	C	^ (XOR) evaluates as true if one <u>but not both</u> operands are true. && (AND) evaluates as true if <u>both</u> operands are true. true&&true^true = true&&false = false																		
6.	D	Math.PI = 3.141592653589793 Math.ceil(x) returns returns the smallest <u>double</u> value that is greater than or equal to the argument and is equal to a mathematical integer.																		
7.	A	10+3.5/4 = 10+0.875 = 10.875																		
8.	E	<table border="1"><tr><td></td><td>m</td><td>n</td></tr><tr><td></td><td>15</td><td>-8</td></tr><tr><td>15&gt;-8 is true</td><td>15</td><td>20</td></tr><tr><td>20&gt;=0 is true</td><td>5</td><td>20</td></tr><tr><td>20*5&lt;=100 is true</td><td>7</td><td>-3</td></tr></table>				m	n		15	-8	15>-8 is true	15	20	20>=0 is true	5	20	20*5<=100 is true	7	-3	
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20*5<=100 is true	7	-3																		
9.	B	x takes on the values 4, 5, 6, 7, and 8. Loop iterates 5 times and prints 5 stars.																		
10.	B	Arrays have a fixed length set at the time of initialization (line #1) even if values are not assigned to every index value.																		
11.	E	The segment of code will compile and execute as intended.																		
12.	C	<table border="1"><tr><td>x</td><td>y</td></tr><tr><td>0</td><td>0</td></tr><tr><td>7</td><td>0</td></tr><tr><td>14</td><td>7</td></tr><tr><td>21</td><td>21</td></tr><tr><td>28</td><td>42</td></tr><tr><td>35</td><td>70</td></tr><tr><td>42</td><td>105</td></tr></table>			x	y	0	0	7	0	14	7	21	21	28	42	35	70	42	105
x	y																			
0	0																			
7	0																			
14	7																			
21	21																			
28	42																			
35	70																			
42	105																			
13.	A	Standard Java operator precedence rules.																		
14.	D	<table border="1"><tr><td>Data Type</td><td>Range of Values</td></tr><tr><td>byte</td><td>-128 to 127</td></tr><tr><td>short</td><td>-32768 to 32767</td></tr><tr><td>int</td><td>-2147483648 to 2147483647</td></tr></table>			Data Type	Range of Values	byte	-128 to 127	short	-32768 to 32767	int	-2147483648 to 2147483647								
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15.	B	<table border="1"><tr><td>0</td><td>1</td><td>2</td><td>3</td></tr><tr><td>3</td><td>14</td><td>-9</td><td></td></tr><tr><td>3</td><td>0</td><td>-9</td><td></td></tr><tr><td>5</td><td>3</td><td>0</td><td>-9</td></tr></table>			0	1	2	3	3	14	-9		3	0	-9		5	3	0	-9
0	1	2	3																	
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5	3	0	-9																	
16.	E	Both s1 and s2 are String objects. When comparing two objects the equality operator (==) returns true if the variables are pointing at the same object. In this case s1 and s2 are not the same object. The equals method determines if two String objects store the exact same string of characters.																		
17.	C	Casting truncates the values stored in the variables d1 and d2. So, 5 + 4 = 9.																		
18.	E	Both B and C are correct.																		
19.	A	The split method divides the string on "a" and removes the "a".																		
20.	B	The code segment switches the top and bottom rows in the 2D array mat.																		
21.	D	Since s is a String, the + operator performs concatenation throughout the expression.																		

22.	B	A binary search works by dividing the list in two on each iteration of the loop and discarding the half of the list that does not contain the target value and continuing the search in the half that does.
23.	A	The method returns the location within the list (index value) of the target value or -1 if the target is not found. In this case the index is stored in <code>i</code> .
24.	D	Reducing the size of the list by $\frac{1}{2}$ on each iteration results in logarithmic time efficiency.
25.	C	The regular expression <code>\\w</code> matches any word character (letters and numbers). The delimiter (in this case letters and numbers) is not printed.
26.	E	<code>nextInt(n)</code> returns the next random integer between 0 (inclusive) and <code>n</code> (exclusive).
27.	B	A, C and E are not valid code. D makes the code throw a <code>NoSuchElementException</code> .
28.	E	Because <code>q</code> is a priority queue, elements are removed in alphabetical order. After adding the original four elements to the queue, the call to <code>poll</code> removes "alpha". After the addition of "chi" the call to <code>remove</code> removes "beta". The elements are then printed in alphabetical order.
29.	A	The loop removes all of the elements in the queue.
30.	B	Returns the 9 <sup>th</sup> term in the Fibonacci sequence. Here is the call stack. Count the ones. 9 8 7 6 5 4 3 2 1 0 1 2 1 0 3 2 1 0 1 4 3 2 1 0 1 2 1 0 5 4 3 2 1 0 1 2 1 0 3 2 1 0 1 6 5 4 3 2 1 0 1 2 1 0 3 2 1 0 1 4 3 2 1 0 1 2 1 0 7 6 5 4 3 2 1 0 1 2 1 0 3 2 1 0 1 4 3 2 1 0 1 2 1 0 5 4 3 2 1 0 1 2 1 0 3 2 1 0 1 
31.	A	<code>x</code> , <code>y</code> and <code>z</code> are passed by value, so their values are never changed in the main method. Here is a trace of the values within the <code>go</code> method: x y z p 5 50 10 0 15 50 10 5 25 50 10 20 35 50 10 45 45 50 10 80 55 50 10 125 
32.	C	A class can have more than one method (in this case the constructors) with the same name as long as their parameter lists differ in either number of parameters or type.
33.	D	The second argument, the integer 231, does not match the type of the 2 <sup>nd</sup> parameter in the three-argument constructor. It would have to be a <code>String</code> .
34.	B	The no argument constructor for the <code>Contestant</code> class does not assign any values to the instance variables. The default values are null for <code>Strings</code> and zero for <code>int</code> .
35.	E	Setter methods should be <code>void</code> and not return anything. The method should assign the parameter <code>s</code> to the field <code>score</code> .
36.	B	Post order visits the nodes left, right, and then root.
37.	C	A cycle is a connected path that begins and ends at the same vertex.
38.	A	$\neg D$ is * (AND). $\neg D$ is + (OR). $\neg D$ is $\oplus$ (XOR).

39.	9	$834 \times 2 / + 5 - =$ $8122 / + 5 - =$ $86 + 5 - =$ $145 - =$ 9
40.	10100110	Write down 90 in binary ignoring the minus sign. 01011010 Find the complement by flipping all of the bits. 10100101 Add one. 10100110