



## American Computer Science League

2019-2020

Contest #3

### INTERMEDIATE DIVISION

#### 1. Boolean Algebra

How many ordered triples make the following expression FALSE?

$$A(\overline{B} + C) + B(A + \overline{C}) + \overline{ABC}$$

1.

#### 2. Boolean Algebra

Simplify the following expression:

$$\overline{A(B + C)} + \overline{B}(\overline{A} + C)$$

2.

#### 3. Data Structures

How many nodes have only one child in the binary search tree for:

WINDSORCONNECTICUT

3.

#### 4. Data Structures

Given an initially empty stack and the following commands on the stack, what will the next popped item be?

PUSH(T), PUSH(H), PUSH(E), PUSH(K), POP(X), POP(X),  
PUSH(I), PUSH(N), POP(X), PUSH(G), PUSH(A), PUSH(N),  
POP(X), POP(X), POP(X), PUSH(D), PUSH(I), POP(X), POP(X).

4.



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### INTERMEDIATE DIVISION

#### 5. FSA's and Regular Expressions

Which of the following strings can be produced by the following regular expression?

$ab^*baa^*baa$

- A.  $ababaa$
- B.  $abbbbbaaaabbaa$
- C.  $abaaaabbaa$
- D.  $abbbbabab$
- E.  $abbbbbaaaba$

5.



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### INTERMEDIATE DIVISION

#### 1. Boolean Algebra

有多少个有序三元组能够使得下述表达式为假?

$$A(\overline{B} + C) + B(A + \overline{C}) + \overline{ABC}$$

1.

#### 2. Boolean Algebra

简化下述表达式:

$$\overline{A(B + C)} + \overline{B}(\overline{A} + C)$$

2.

#### 3. Data Structures

在下述二叉搜索树中, 有多少个节点只有一个子节点?

WINDSORCONNECTICUT

3.

#### 4. Data Structures

给定一个初始为空的堆栈和堆栈上的以下命令, 下一个要弹出的项是什么?

PUSH(T), PUSH(H), PUSH(E), PUSH(K), POP(X), POP(X),  
PUSH(I), PUSH(N), POP(X), PUSH(G), PUSH(A), PUSH(N),  
POP(X), POP(X), POP(X), PUSH(D), PUSH(I), POP(X), POP(X).

4.



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### INTERMEDIATE DIVISION

#### 5. FSA's and Regular Expressions

5.

下述正则表达式能产生以下哪些字符串？

$ab^*baa^*baa$

- A.  $ababaa$
- B.  $aabbbbaaaabbaa$
- C.  $abaaabbaa$
- D.  $abbbbabab$
- E.  $abbbbbaaaba$