

# American Computer Science League

2020-2021 • Contest 3: Shorts • Senior Division

<b>1. Boolean Algebra</b>  Identify the ordered triples that make the following expression FALSE? $A \overline{B} + \overline{B}C + \overline{A}C$	A. (1,1,1) B. (1,1,*) C. (*,1,1) D. (0,*,*) E. (1,1,1), (1,0,0), (0,1,0)
<b>2. Boolean Algebra</b>  How many ordered triples make the following expression TRUE? $\overline{A} \overline{AB} \overline{BC} + \overline{C}$	A. 8 B. 7 C. 6 D. 5 E. 4
<b>3. Data Structures</b>  Find the internal path length of the binary search tree that is created from the following:  SPACESTATION	A. 48 B. 38 C. 36 D. 35 E. 30
<b>4. Data Structures</b>  Given an initially empty stack with the additional rule that, no letter is pushed onto the stack if it is identical to the top of the stack, what will the next popped item be?  PUSH(A), PUSH(T), PUSH(T), POP (X), PUSH(A), PUSH(C), PUSH(K), POP(X), POP(X), PUSH(O), PUSH(F), PUSH(T), POP(X), PUSH(H), PUSH(E), PUSH(E), PUSH(M), PUSH(P), POP(X), POP(X), PUSH(I), PUSH(R), POP(X), POP(X), PUSH(E), POP(X), POP(X)	A. A B. F C. H D. O E. nil

## 5. FSA's & Regular Expressions

Given the regular expression: `[^dkp]*[aeiou][a-el-t]?(s|es|er)`

Identify all of the following strings that are **not** accepted.

- |            |            |            |
|------------|------------|------------|
| A. dahlias | D. aster   | G. clover  |
| B. roses   | E. azaleas | H. lilacs  |
| C. lilies  | F. irises  | I. violets |

- A. A, E, G
- B. D, E, G,
- C. A, C, D, G
- D. A, B, D, E, G
- E. A, D, G

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## 1. Boolean Algebra

下列哪个有序三元组使得下述表达式为假？

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

- A. (1,1,1)
- B. (1,1,\*)
- C. (\*,1,1)
- D. (0,\*,\*)
- E. (1,1,1), (1,0,0), (0,1,0)

## 2. Boolean Algebra

有多少个有序三元组能够使得下述表达式为真？

$$\overline{A}\overline{AB}\overline{BC} + \overline{C}$$

- A. 8
- B. 7
- C. 6
- D. 5
- E. 4

## 3. Data Structures

由以下字母创建的二叉搜索树的内部路径长度为：

SPACESTATION

- A. 48
- B. 38
- C. 36
- D. 35
- E. 30

## 4. Data Structures

给定一个初始为空的栈，并附加一条规则：如果即将进栈的字母与栈顶的字母是相同的，则该字母不执行进栈操作。在执行下述操作后，请问下一个即将出栈的元素是哪个？

PUSH(A), PUSH(T), PUSH(T), POP(X), PUSH(A), PUSH(C),  
PUSH(K), POP(X), POP(X), PUSH(O), PUSH(F), PUSH(T), POP(X),  
PUSH(H), PUSH(E), PUSH(E), PUSH(M), PUSH(P), POP(X), POP(X),  
PUSH(I), PUSH(R), POP(X), POP(X), PUSH(E), POP(X), POP(X)

- A. A
- B. F
- C. H
- D. O
- E. nil

## 5. FSA's & Regular Expressions

给定一个正则表达式: `[^dkp]*[aeiou][a-el-t]?(s|es|er)`

以下哪些字符串是**无法匹配**的?

- |            |            |            |
|------------|------------|------------|
| A. dahlias | D. aster   | G. clover  |
| B. roses   | E. azaleas | H. lilacs  |
| C. lilies  | F. irises  | I. violets |

- A. A, E, G
- B. D, E, G,
- C. A, C, D, G
- D. A, B, D, E, G
- E. A, D, G