

# American Computer Science League

2020-2021 • Contest 3: Shorts • Intermediate Division

<p><b>1. Boolean Algebra</b></p> <p>Identify all of the ordered triples that make the following expression TRUE:</p> $A(\overline{B} + \overline{C}) + ABC$	<p>A. (1,0,*) B. (1,*,0) C. (1,*,*) D. (*,1,*) E. (1,*,*), (0,1,1)</p>
<p><b>2. Boolean Algebra</b></p> <p>How many ordered triples make the following expression TRUE?</p> $\overline{B}(\overline{A + C}) + (\overline{B} \overline{C})$	<p>A. 8 B. 6 C. 4 D. 2 E. 0</p>
<p><b>3. Data Structures</b></p> <p>Find the number of nodes that have only one child in the binary search tree for:</p> <p>LUNARMODULE</p>	<p>A. 1 B. 2 C. 3 D. 4 E. 5</p>
<p><b>4. Data Structures</b></p> <p>Given an initially empty queue and the following commands on the queue, what will the next popped item be?</p> <p>PUSH(D), PUSH(A), PUSH(R), POP(X), PUSH(T), PUSH(H), POP(X), PUSH(V), PUSH(A), PUSH(D), POP(X), POP(X), PUSH(E), PUSH(R), POP(X), POP(X), POP(X)</p>	<p>A. A B. D C. E D. R E. nil</p>

## 5. FSAs & Regular Expressions

Given the regular expression:

`[^s][aeiou][p-t]*(s|er)`

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

- |          |            |           |            |
|----------|------------|-----------|------------|
| A. tater | B. sorts   | C. faster | D. plaques |
| E. deer  | F. rooster | G. hits   | H. bursts  |

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

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<p>1. <b>Boolean Algebra</b></p> <p>下列哪个有序三元组能够使得下述表达式为真？</p> $A(\overline{B} + \overline{C}) + ABC$	<p>A. (1,0,*) B. (1,*,0) C. (1,*,*) D. (*,1,*) E. (1,*,*), (0,1,1)</p>
<p>2. <b>Boolean Algebra</b></p> <p>共有多少对有序三元组能够使得下述表达式为真？</p> $\overline{B}(\overline{A + C}) + (\overline{B} \ C)$	<p>A. 8 B. 6 C. 4 D. 2 E. 0</p>
<p>3. <b>Data Structures</b></p> <p>在下述二叉搜索树中，有多少个节点只有一个子节点？</p> <p>LUNARMODULE</p>	<p>A. 1 B. 2 C. 3 D. 4 E. 5</p>
<p>4. <b>Data Structures</b></p> <p>给定一个初始为空的队列，在该队列中执行下述操作后，下一个即将出队的元素是哪个？</p> <p>PUSH(D), PUSH(A), PUSH(R), POP(X), PUSH(T), PUSH(H), POP(X), PUSH(V), PUSH(A), PUSH(D), POP(X), POP(X), PUSH(E), PUSH(R), POP(X), POP(X), POP(X)</p>	<p>A. A B. D C. E D. R E. nil</p>

## 5. FSAs & Regular Expressions

给定下列正则表达式:

`[^s][aeiou][p-t]*(s|er)`

下列哪些字符串是**无法**匹配的？

- |          |            |           |            |
|----------|------------|-----------|------------|
| A. tater | B. sorts   | C. faster | D. plaques |
| E. deer  | F. rooster | G. hits   | H. bursts  |

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