

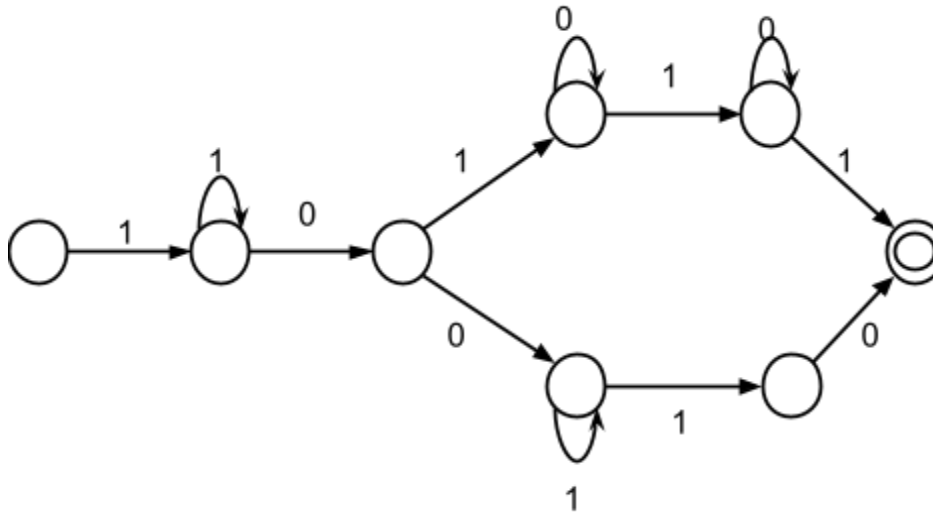
# American Computer Science League

2023-2024 • Contest 3: Short Problems • Intermediate Division

<b>1. Boolean Algebra</b>  How many ordered triples make this expression TRUE? $\overline{A(\overline{B + C})(\overline{AB + BC})}$	A. 0 B. 1 C. 2 D. 3 E. 4
<b>2. Data Structures</b>  Find the number of nodes that have only 1 child in the binary search tree for:  <b>PONTIACVIBE</b>	A. 4 B. 5 C. 6 D. 7 E. 8
<b>3. Data Structures</b>  What does the final stack look like from the top to the bottom after performing the following algorithm on an initially empty stack when using the word “ALPHABETS”?  for letter = each letter in a word if the letter is a vowel PUSH(letter) else x = POP() PUSH(letter) PUSH(x) end if next letter	A. ALPHABETS B. ESTABAHPL C. LPHABATSE D. HPLABASTE E. STEBAHPLA

#### 4. FSAs

How many of the following strings satisfy the FSA below?



- A. 1
- B. 2
- C. 3
- D. 4
- E. 5

- |               |            |            |
|---------------|------------|------------|
| a. 1101011010 | b. 11010   | c. 1111111 |
| d. 1010101    | e. 1100110 | f. 1001110 |

#### 5. Regular Expressions

Today the pop-up ACSL Coffee Shop is open for business. Only coffee that satisfies the following regular expression may be ordered. How many different kinds of coffee are available?

$[b-j][aeiou][^k]^*$

- |          |       |            |
|----------|-------|------------|
| regular  | decaf | latte      |
| dark     | drip  | iced       |
| espresso | black | cappuccino |

- A. 2
- B. 3
- C. 4
- D. 5
- E. 6