



American Computer Science League

2019-2020

Contest #3

SENIOR DIVISION

1. Boolean Algebra

How many ordered triples make the following FALSE?

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

1.

2. Boolean Algebra

Which ordered triples make the following TRUE?

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

2.

3. Data Structures

What is the internal path length in the binary search tree for:

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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), POP(X), PUSH(P), PUSH(H),
POP(X), PUSH(A), PUSH(N), PUSH(T), POP(X), POP(X),
POP(X), PUSH(O), PUSH(M), POP(X), POP(X), PUSH(O),
PUSH(F), PUSH(T), PUSH(H), POP(X), POP(X), PUSH(E),
PUSH(O), POP(X), PUSH(P), PUSH(E), PUSH(R), POP(X),
POP(X), POP(X), PUSH(A), POP(X), POP(X).

4.



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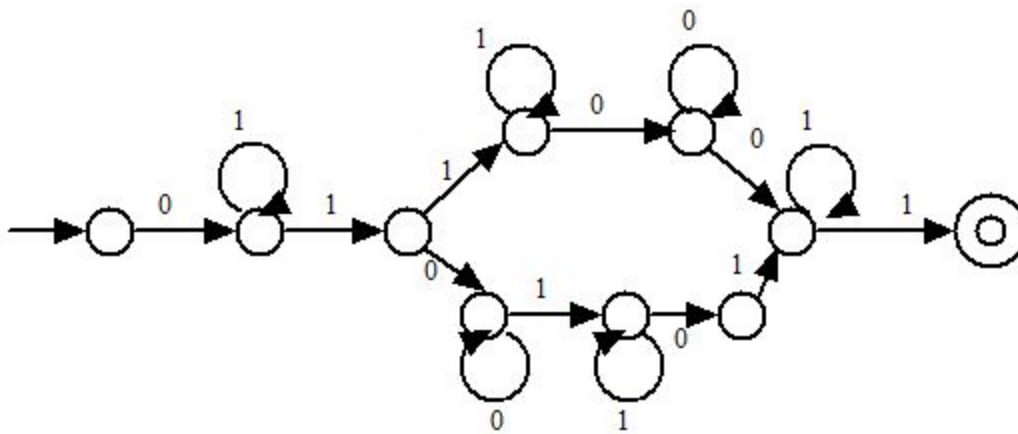
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5. FSA's and Regular Expressions

Translate the following FSA into the Regular Expression it represents:



5.