

Senior Division

1. Boolean Algebra

Simplify the following Boolean expression:

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

2. Boolean Algebra

How many ordered triples make the following Boolean expression TRUE?

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

3. Data Structures

List all nodes that have two children in the binary search tree for:

GREATEXPECTATIONS

4. Data Structures

The operation SW switches a queue to a stack and a stack to a queue. Given an initially empty queue and the following sequence of operations, what would be the next POPPED element?

PUSH(M), PUSH(I), PUSH(S), POP(X), PUSH(S), PUSH(H), POP(X), POP(X), PUSH(A), POP(X), SW, PUSH(V), PUSH(I), POP(X), PUSH(S), PUSH(H), PUSH(A), POP(X), PUSH(M), POP(X), POP(X)

5. Regular Expressions and FSA's

Which of the following strings are accepted by the following regular expression? List all.

$$a b b^*(a \cup b^*) a (b^* \cup a^*)$$

- a) *ababbaab*
- b) *ababa*
- c) *aaabb*
- d) *abbbbab*
- e) *abbaababbaa*