

# American Computer Science League

2023-2024 • Contest 3: Short Problems Solutions • Junior Division

## 1. Boolean Algebra

$$A + B(\bar{A} + B) = A + \bar{A}B + B$$

$$= A + B(\bar{A} + 1)$$

$$= A + B$$

This is TRUE for (1,0), (0,1) (1,1). So 3 make it TRUE.

D. 3

## 2. Boolean Algebra

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

$$= A + \bar{B}\bar{C} + \bar{B} + \bar{\bar{A}}\bar{\bar{C}}$$

$$= A + \bar{B}\bar{C} + \bar{B} + AC$$

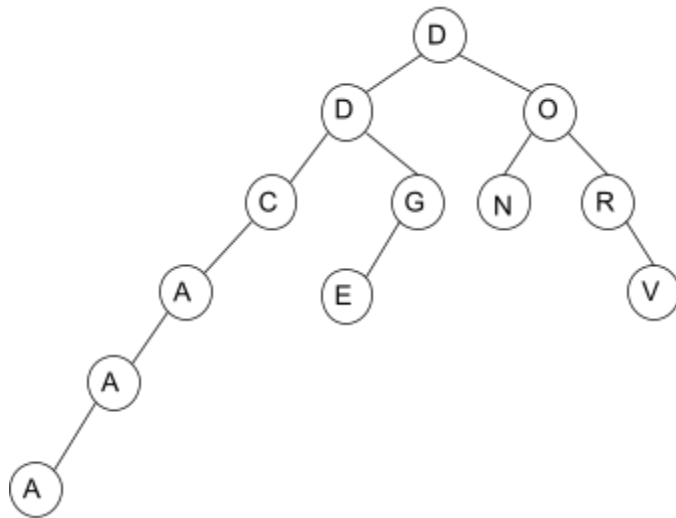
$$= A(1 + C) + \bar{B}(\bar{C} + 1)$$

$$= A + \bar{B}$$

C.  $A + \bar{B}$

## 3. Data Structures

The binary search tree for DODGECARAVAN is:



The depth is 5.

D. 5

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## 4. Data Structures

The stack is constructed using LIFO as follows:

A AL ALP ALPH ALP AL ALA ALAB ALA ALAE ALAET ALAE

The next item popped would be: E

The queue is constructed using FIFO as follows:

A AL ALP ALPH LPH PH PHA PHAB HAB HABE HABET ABET

The next item popped would be: A

E. stack top="E",  
queue front="A"

## 5. What Does This Program Do? (Arrays)

The program finds is the longest increasing length of numbers  
in the array which is 4.

D. 4