

1. Boolean Algebra

Simplify the following Boolean expression:

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

A. 0

B. 1

C. \overline{B}

D. $\overline{A} + B + \overline{C}$

E. $\overline{A} + \overline{B} + \overline{C}$

$$\overline{A} + B + \overline{A} + \overline{B} + C + B + \overline{C} = 1$$

1

2. Boolean Algebra

How many ordered triple(s) make the following Boolean expression TRUE?

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

A. 0

B. 3

C. 5

D. 7

E. 8

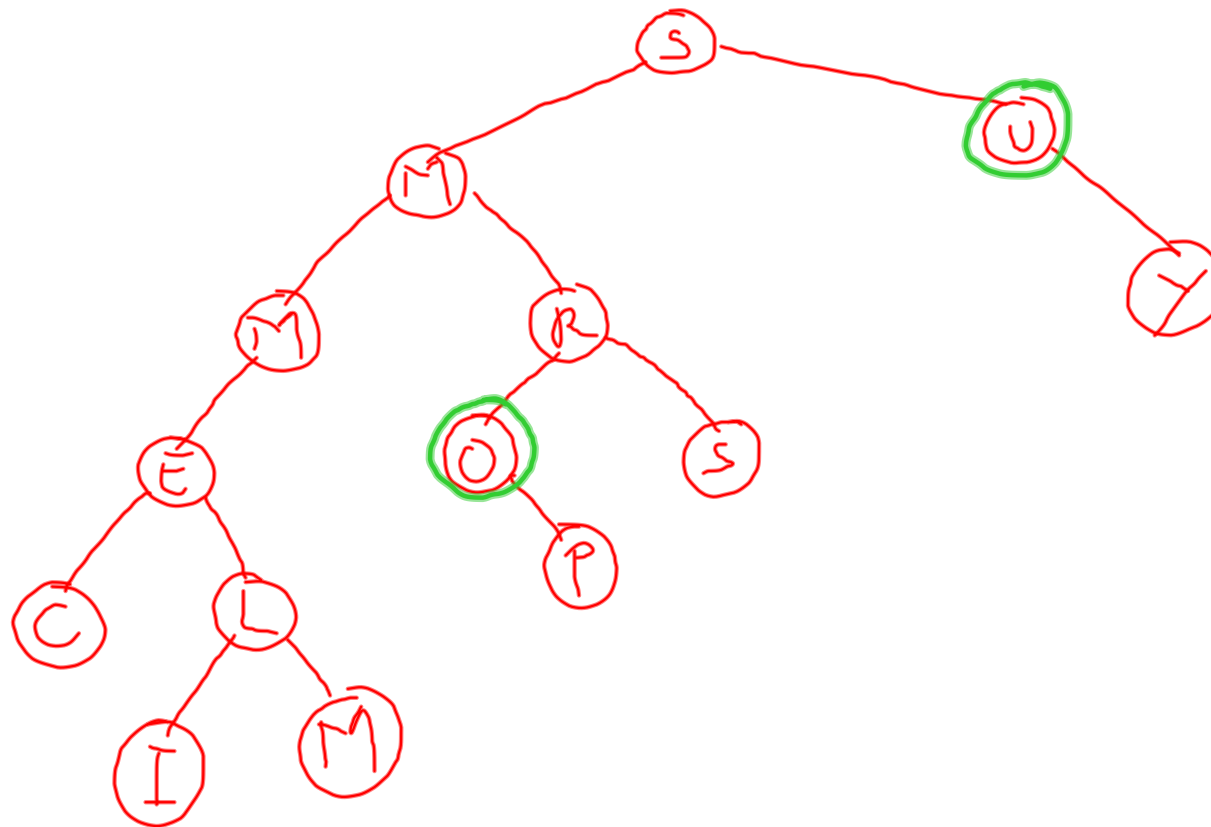
$\overline{A}\overline{B} + \overline{A}B + A\overline{C}$

A	B	C	$\overline{A}\overline{B}$	$\overline{A}B$	$A\overline{C}$	Sum
0	0	0	0	0	1	1
0	0	1	0	0	0	0
0	1	0	0	1	1	1
0	1	1	0	1	0	1
1	0	0	1	0	0	1
1	0	1	1	0	0	1
1	1	0	0	0	0	0
1	1	1	0	0	0	0

3. Data Structures

How many nodes have only a right child in the binary search tree for:

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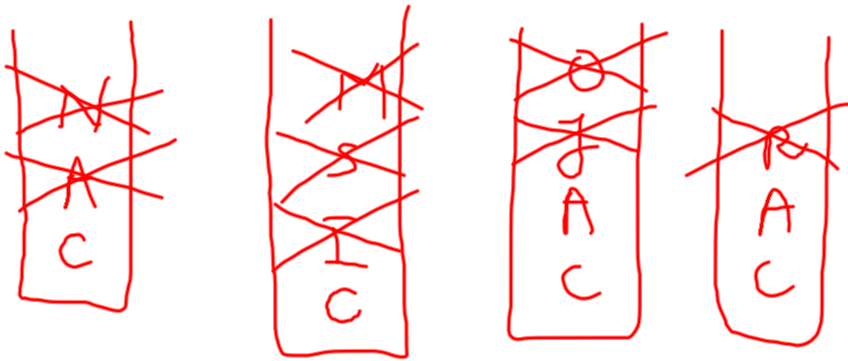
- A. 0
- B. 1
- C. 2
- D. 3
- E. 4

4. Data Structures

Given an initially empty stack and the following commands on the stack, what will be the next item popped?

PUSH("C"), PUSH("A"), PUSH("N"), X=POP(),
X=POP(), PUSH("I"), X=POP(), PUSH("S"),
PUSH("M"), X=POP(), X=POP(), PUSH("A"),
PUSH("J"), X=POP(), PUSH("O"), X=POP(),
PUSH("R"), X=POP()

- A. S
- B. M
- C. I
- D. C
- E. A



5. FSAs and Regular Expressions

A new company is allowing its employees to select their own phone number and extension if it satisfies this regular expression:

$1-321-[^05][0-9][^5]-[12][3-6][^7-9]8-[^0][2-6]$

Which of the following are acceptable phone numbers and extensions?

- a. 1-321-123-2348-11
- b. 1-321-155-2368-96
- c. 1-321-444-2448-44
- d. 1-321-927-2408-84
- e. 1-321-559-2328-13
- f. 1-321-306-1366-62

- A. a, f
- B. b, c
- C. e, f
- D. c, d
- E. a, e

- a. 1-321-123-2348-11
- b. 1-321-155-2368-96
- c. 1-321-444-2448-44 ✓
- d. 1-321-927-2408-84 ✓
- e. 1-321-559-2328-13
- f. 1-321-306-1366-62