

### 1. Boolean Algebra

Which ordered pair makes the following Boolean expression TRUE?

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

- A. (0, 0)
- B. (0, 1)
- C. (1, 0)
- D. (1, 1)
- E. None of the above

~~$\overline{A} \cdot \overline{A} \cdot B$~~  +  $\overline{A} \cdot \overline{B}$

0

Acesta e 1 doar dacă

$$\begin{array}{l} \overline{A} = 1 \\ \overline{B} = 1 \end{array} \left\{ \begin{array}{l} A = 0 \\ B = 0 \end{array} \right.$$

## 2. Boolean Algebra

Simplify the following Boolean expression:

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

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

- A.  $\bar{A} + B + \bar{C}$
- B.  $B + \bar{A}C + \bar{C}$
- C.  $\bar{A}\bar{B} + B + \bar{C}$
- D.  $\bar{B} + \bar{C} + \bar{A}B$
- E.  $C + \bar{A} + \bar{B}$

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

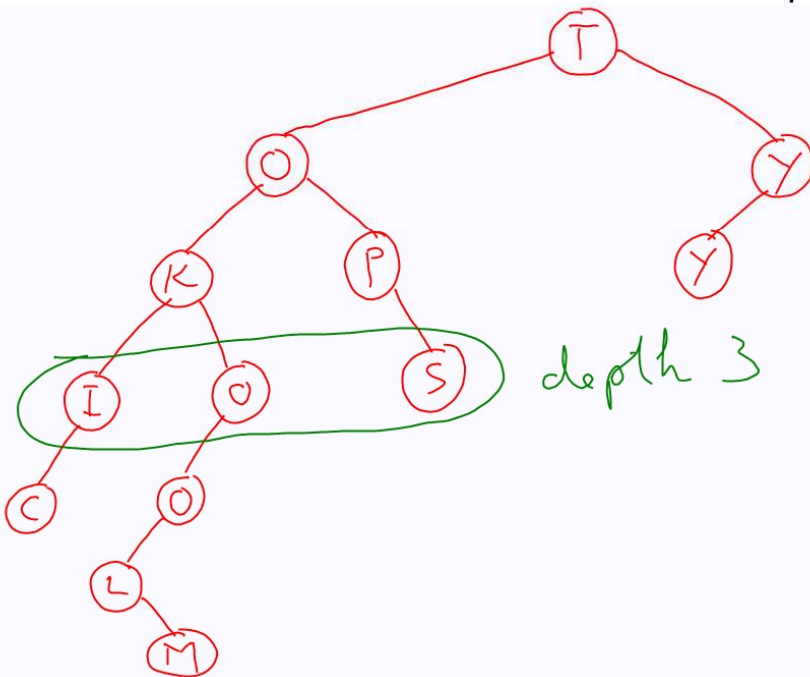
↑

### 3. Data Structures

What nodes (listed left to right) are at a depth of 3 in the binary search tree for:

TOKYOOLYMPICS

- A. S O I
- B. C O L
- C. I P S
- D. K P Y
- E. I O S



#### 4 Data Structures

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

PUSH("A"), PUSH("Q"), PUSH("U"), X=POP( ),  
PUSH("A"), PUSH("R"), X=POP( ), X=POP( ),  
PUSH("T"), X=POP( ), PUSH("U"), PUSH("S")

- A. A
- B. I
- C. R
- D. U
- E. S

← Scoatem ~~AXUAR~~ TUS ← Bāgān

5. What Does This Program Do? (Arrays)

After the following program is executed, how many elements in the array are not zero?

```
for i = 0 to 3
  for j = 0 to 3
    a(i,j) = 2 * i + 3 * j
  next j
next i
for i = 0 to 3
  for j = 0 to 3
    if a(i,j) >= 10 then
      a(i,j) = a(i,j) - 10
    end if
    if a(i,j) < 6 then
      a(i,j) = 0
    end if
  next j
next i
```

- A. 0
- B. 4
- C. 6
- D. 10
- E. 16

| i \ j | 0              | 1              | 2               | 3               |
|-------|----------------|----------------|-----------------|-----------------|
| 0     | 0              | <del>3</del> 0 | 6               | 9               |
| 1     | <del>2</del> 0 | <del>5</del> 0 | 8               | <del>11</del> 0 |
| 2     | <del>4</del> 0 | 7              | <del>10</del> 0 | <del>13</del> 0 |
| 3     | 6              | 9              | <del>12</del> 0 | <del>15</del> 0 |