American Computer Science League

2021-2022 ● Contest 2: Shorts ● Senior Division Solutions

1. Prefix/Infix/Postfix

A C + A 2 ^ / C A B− / − = (A C +) (A 2 ^) / C (A B−) / −
= ((+ A C) (^ A 2) /) (C (− A B) /) −
= ((/ + A C ^ A 2) (/ C − A B) −)
= − / + A C ^ A 2 / C − A B

C. − / + A C ^ A 2 / C − A B

2. Prefix/Infix/Postfix

% − ! 5 / ! 8 ! + 2 4 = % − (! 5) /(! 8) ! (+ 2 4)
= % − 120 / 40320 (! 6)
= % − 120 (/ 40320 720)
= % (− 120 56)
= (% 64)
= 64

A. 64

3. Bit-String Flicking

(LCIRC-2 01101) OR (RSHIFT-1 11011) AND 01000
= 10101 OR (01101 AND 01000)
= 10101 OR 01000
= 11101

E. 11101

4. Bit-String Flicking

Let X = abcde

LHS = (LSHIFT-1 (01101 OR (RCIRC-2 10010))) XOR X
= (LSHIFT-1 (01101 OR 10100)) XOR abcde
= (LSHIFT-1 11101) XOR abcde
= 11010 XOR abcde
RHS = 10110
LHS = RHS ⇒ 1 XOR a = 1, a = 0
1 XOR b = 0, b = 1
0 XOR c = 1, c = 1
1 XOR d = 1, d = 0
0 XOR e = 0, e = 0
Therefore X = 01100

B. 01100

5. LISP

(CAADDR ‘((1 2 (3)) (4 (5) 6) ((5 4) (3 (2)))))
= (CAADR ‘((4 (5) 6) ((5 4) (3 (2)))))
= (CAAR ‘(((5 4) (3 (2)))))
= (CAR ‘((5 4) (3 (2))))
= (5 4)

D. (5 4)