American Computer Science League

2020-2021 ● Contest 2: Shorts Solutions ● Senior Division

1. Prefix-Infix-Postfix

Prefix: − + A ^ B 2 ^ / * A C + B C 3
= − + A (^ B 2) ^ / (* A C) (+ B C) 3
= − (+ A (^ B 2)) ^ (/ (* A C) (+ B C)) 3
= − (+ A (^ B 2))(^ (/ (* A C) (+ B C)) 3)
= (A (B 2 ^) +) (((A C *) (B C +) /) 3 ^) −
Postfix: AB2^+AC*BC+/3^−

1. AB2^+AC*BC+/3^− (D)

2. Prefix-Infix-Postfix

− * 4 ^ x y − * 9 x ^ 6 y
= − * 4 (^ -5 2) − (* 9 -5) (^ 6 2)
= − (* 4 25) (− -45 36)
= − 100 -81
= 181

2. 181 (E)

3. Bit-String Flicking

((RCIRC-3 01110) XOR 10111 AND 01111 OR (LSHIFT-2 11101))
= (11001 XOR (10111 AND 01111) OR 10100)
= ((11001 XOR 00111) OR 10100)
= (11110 OR 10100)
= 11110

3. 11110 (B)

4. Bit-String Flicking

Let X = abcde
LHS = (RSHIFT-1 ((RCIRC-2 01101) AND X))
= (RSHIFT-1 (01011 AND abcde))
= (RSHIFT-1 0b0de)
= 00b0d
RHS = (LCIRC-4 00010)
= 00001
LHS = RHS ⇒ 00b0d = 00001
⇒ b = 0, d = 1, a = *, c = *, e = *
⇒ *0*1* There are 3 *s which is 8 strings.

4. *0*1* (C)

5. LISP

(CDR (CAR (CDR (CDR '(a (b (c d)) (e f g))))))
= (CDR (CAR (CDR '((b (c d)) (e f g)))))
= (CDR (CAR '((e f g))))
= (CDR '(e f g))
= (f g)

5. (f g) (D)