ACSL

American Computer Science League

2019-2020 — **Contest #2**

INTERMEDIATE DIVISION SOLUTIONS

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1. Prefix/Infix/Postfix Notation

$$\frac{A+B^2}{A^2} - \frac{AC}{B} + ABC$$

= ((A + B ↑ 2) / (A ↑ 2)) - ((A * C) / B) + (A * B * C)
= ((A + (B 2 ↑)) / (A 2 ↑)) - (A C * B /) + (A B * C *)
= (A B 2 ↑ + A 2 ↑ /) - (A C * B /) + (A B * C * +)
= A B 2 ↑ + A 2 ↑ / A C * B / - A B * C * +

1. As shown

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2. Prefix/Infix/Postfix Notation

\+ − ∗ 4 − 8 / 6 3 / + ↑ 3 2 ↑ 4 2 5 / / ↑ 6 3 * 4 3 2
= + − ∗ 4 − 8 (/ 6 3) / + (↑ 3 2) (↑ 4 2) 5 / / (↑ 6 3) (* 4 3) 2
= + − ∗ 4 (− 8 2) / (+ 9 16) 5 / (/ 216 12) 2
= + − (∗ 4 6) (/ 25 5) (/ 18 2)
= + (− 24 5) 9
= + 19 9
= 28

2. 28

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3. Bit-String Flicking

(LSHIFT-1 (LCIRC-2 (RSHIFT-1 (NOT 100001))))
= (LSHIFT-1 (LCIRC-2 (RSHIFT-1 011110)))
= (LSHIFT-1 (LCIRC-2 001111))
= (LSHIFT-1 111100)
= 111000

3. 111000

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4. Bit-String Flicking

Let X = abcde
LHS = (LCIRC-2 (RCIRC-4 X OR LSHIFT-1 01001 AND
NOT 01010))
= (LCIRC-2 (RCIRC-4 abcde OR LSHIFT-1 01001 AND
NOT 01010))
= (LCIRC-2 (bcdea OR 10010 AND 10101))
= (LCIRC-2 (bcdea OR 10000))
= (LCIRC-2 1cdea) = dea1c
So dea1c = 10011. Then d = 1, e = 0, a = 0, c = 1, b = * → 0*110

4. 0*110

5. LISP

(CAR (CDR (CAR (CDR '(1 (2 (3 4)(5 6) 7) 8)))))
= (CAR (CDR (CAR '((2 (3 4)(5 6) 7) 8))))
= (CAR (CDR '(2 (3 4)(5 6) 7)))
= (CAR '((3 4)(5 6) 7))
= (3 4)

5. (3 4)