American Computer Science League

2017-2018 **Contest #2**

SENIOR DIVISION SOLUTIONS

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1. Prefix/Infix/Postfix Notation

A B C + * B C * / A 2 ↑ C – B C − / +
= A (B C +) *(B C *) / (A 2 ↑) C – (B C −) / +
= [A (+ B C) *] (* B C) / [(↑ A 2) C −] (− B C) / +
= [(* A + B C) (* B C) /] [(− ↑ A 2 C) (− B C) /] +
= [(/ * A + B C * B C) (/ − ↑ A 2 C − B C) +]
= + / * A + B C * B C / − ↑ A 2 C − B C

1. As shown

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2. Prefix/Infix/Postfix Notation

/ ! a * ! − a b ! b = / (! 8) * ! (− 8 6) (! 6) = / (8!) * [! 2] (6!)
= / (8!) [* (2!)(6!)] = / (8!) (2! * 6!) = 8! / (2! * 6!)
= 40320 / (2 * 720) = 40320 / 1440 = 28

2. 28

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3. Bit-String Flicking

(LSHIFT–2 (10110 AND (NOT 00100))) OR
(RCIRC–1 (RSHIFT–1 (11011 AND (LCIRC–2 10001))))
= (LSHIFT–2 (10110 AND 11011)) OR
(RCIRC–1 (RSHIFT–1 (11011 AND 00110)))
= (LSHIFT–2 10010) OR (RCIRC–1 (RSHIFT–1 00010))
= 01000 OR (RCIRC–1 00001) = 01000 OR 10000 = 11000

3. 11000

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4. Bit-String Flicking

Let X = abcde
(RSHIFT–1 (LCIRC–2 X)) OR (NOT(RCIRC–3(LSHIFT–1 00100))) = 11110
LHS = (RSHIFT–1 (LCIRC–2 abcde)) OR (NOT(RCIRC–3 01000))
= (RSHIFT–1 cdeab) OR (NOT 00001)
= 0cdea OR 11110 = 1111a
If 1111a = 11110, then a = 0, b = *, c = *, d = *, e = *
Therefore X = 0****

4. 0****

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5. LISP

(CDR (CAR (REVERSE (CDR '((2 (a 3) b) c (d 4 5) (e (f 6) g))))))
= (CDR (CAR (REVERSE '(c (d 4 5) (e (f 6) g)))))
= (CDR (CAR '((e (f 6) g) (d 4 5) c)))
= (CDR '(e (f 6) g))
= ((f 6) g)

5. ((f 6) g)

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