American Computer Science League

2018-2019 **Contest #2**

JUNIOR DIVISION SOLUTIONS

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1. Pre/Post/Infix Notation

+ − / * 2 + 3 5 4 / 9 − ↑ 2 2 1 / + * 3 5 * 6 2 ↑ 3 2
= + − / * 2 (+ 3 5) 4 / 9 − (↑ 2 2) 1 / + (* 3 5) (* 6 2) (↑ 3 2)
= + − / (* 2 8) 4 / 9 (− 4 1) / (+ 15 12) 9
= + − (/ 16 4) (/ 9 3) (/ 27 9)
= + (− 4 3) 3 = + 1 3 = 4

1. 4

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2. Pre/Post/Infix Notation

$3(a + 2\ b) / (a^2 - b/4) + a(ab + b^2) / 2$
= 3 * (a + 2 * b) / (a ↑ 2 − b / 4) + a * (a * b + b ↑ 2) / 2
= 3 * (a + (2 b *)) / ((a 2 ↑) − (b 4 /)) + a * ((a b *) + (b 2 ↑)) / 2
= 3 * (a 2 b * +) / (a 2 ↑ b 4 / −) + a * (a b * b 2 ↑ +) / 2
= (3 a 2 b * + * a 2 ↑ b 4 / − /) + (a a b * b 2 ↑ + * 2 /)
= 3 a 2 b * + * a 2 ↑ b 4 / − / a a b * b 2 ↑ + * 2 / +

2. As shown

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3. Bit-String Flicking

10011 OR 01110 AND 10101 = 10011 OR (01110 AND 10101)
= 10011 OR 00100
= 10111

3. 10111

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4. Bit-String Flicking

(LCIRC-2 01101) OR (RSHIFT-1 11111)
= 10101 OR 01111
= 11111

4. 11111

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5. What Does This Program Do? - Loops

The i loop gives the variable a values of 1, 5, 14, 30, 55 by adding the squares. The j loop gives the variable c values of 10, 30, 60, 100, 150 by adding 5 times the value of j. Going into the k loop, a = 55, b = 5, c = 150 and d = 25. This loop counts the factors of these numbers from 2 to 25. There are 12 factors. a : 5, 11 b: 5
c: 2, 3, 5, 6, 10, 15, 25 d: 5, 25

5. 12