

# American Computer Science League

2022-2023 • Contest 2: Short Problems Solutions • Junior Division

<b>1. Prefix/Infix/Postfix Notation</b>  $\begin{aligned}+- * 2 3 / 4 2 ^ 2 3 &= +- (* 2 3) (/ 4 2) (^ 2 3) \\&= +- (2 * 3) (4 / 2) (2 ^ 3) \\&= + (- 6 2) 8 \\&= + (6 - 2) 8 \\&= (+ 4 8) \\&= 4 + 8 \\&= 12\end{aligned}$	C. 12
<b>2. Prefix/Infix/Postfix Notation</b>  $\begin{aligned}\frac{A+B}{C} - \frac{B*C}{A-C} &= (A + B) / C - B * C / (A - C) \\&= (A B +) / C - (B C *) / (A C -) \\&= ((A B +) / C) - ((B C *) / (A C -)) \\&= (A B + C /) - (B C * A C - /) \\&= A B + C / B C * A C - / -\end{aligned}$	A. AB+C/BC*AC-/-A
<b>3. Bit-String Flicking</b>  $\begin{aligned}10100 \text{ OR } 01100 \text{ AND } 01011 &= 10100 \text{ OR } (01100 \text{ AND } 01011) \\&= 10100 \text{ OR } 01000 \\&= 11100\end{aligned}$	B. 11100
<b>4. Bit-String Flicking</b>  $\begin{aligned}(\text{LCIRC-2 (RSHIFT-1 (NOT 01110))}) &= (\text{LCIRC-2 (RSHIFT-1 10001)}) \\&= (\text{LCIRC-2 01000}) \\&= 00001\end{aligned}$	C. 00001
<b>5. What Does This Program Do? (Looping)</b>  This program calculates the compounded interest on \$1000 at a yearly rate of 10% for 3 years. 1st year    \$1000 * .10 = \$100 2nd year    \$1100 * .10 = \$110 3rd year    \$1210 * .10 = \$121 Total interest \$1331-\$1000 = \$331	D. 331