2004-2005 **American Computer Science League** Contest #2

**Intermediate Division Solutions**

**1. Computer Number Systems**

$FF_{16} * 10001_2 = 11111111_2$

$\times\ 10001_2$

11111111

111111110000

$1\ 000\ 011\ 101\ 111_2 = 10357_8$

1. $10357_8$

**2. Boolean Algebra**

$\overrightarrow{(A+B)}\ (A\overline{B}+B\overline{C}) = \overline{A}\overline{B}\ (A\overline{B}+B\overline{C}) =$

$A\overline{A}\overline{B}+\overline{A}B\overline{B}\overline{C} = 0+0 = 0$

2. 0

**3. Boolean Algebra**

$\overline{A}(B+\overline{C})+A\overline{B}C$

| A | B | C | $\overline{A}$ | $\overline{B}$ | $\overline{C}$ | $\overline{A}(B+\overline{C})$ | $A\overline{B}C$ | $\overline{A}(B+\overline{C})+A\overline{B}C$ |
|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 |
| 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 |
| 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 |
| 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 |
| 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |

3. 4

**4. Bit String Flicking**

(RCIRC-3 (LSHIFT-1 (LCIRC-2 (RSHIFT-1 10110 ) ) ) ) =
(RCIRC-3 (LSHIFT-1 (LCIRC-2 01011) ) )
(RCIRC-3 (LSHIFT-1 01101) )
(RCIRC-3 11010) = 01011

4. 01011

**5. Bit String Flicking**

(LCIRC-2 01110) AND X = (RSHIFT-1 10011)
Let X = abcde
11001 AND abcde = 01001 implies
a = 0, b = 1, c = *, d = *, e = 1

5. 01**1