2001-2002 **American Computer Science League** **Contest #1**

Classroom Division Solutions 1 - 5

1. 246_8 converts to $1010\ 0110_2$. This converts to $A6_{16}$

1. A6 or $A6_{16}$

2. Add the digits from right to left as follows
$8 + C = 14_{16}$
$5 + B + 1 = 11_{16}$
$3 + 8 + 1 = C_{16}$
$A + E = 18_{16}$
$B + A + 1 = 16_{16}$

2. 168C14 or $168C14_{16}$

3. The table below gives the values of the variables

K	C	S
0	0	1
1	1	-1
2	0	1
3	1	-1
4	0	1
5	1	-1
6	0	1
7	1	-1
8	0	1

3. 0

4. f (6) = f (5) +6 = 15 + 6 = 21
f (5) = f (4) + 5 = 10 + 5 = 15
f (4) = f (3) + 4 = 6 + 4 = 10
f (3) = 2 * 3 = 6

4. 21

5. f (17) = 17 + f (12) = 17 + 15 = 32
f (12) = 12 + f (7) = 12 + 3 = 15
f (7) = 7 + f (2) = 7 + (-4) = 3
f (2) = 2 - f (3) = 2 - 6 = -4
f (3) = 2 * 3 = 6

5. 32

Classroom Division Solutions 6 - 10

6. BED converts to $1011\ 1110\ 1101_2$. Regrouping to sets of 3 digits gives $101\ 111\ 101\ 101_{2.}$ This converts to 5755_8	6. 5755_8 or 5755
7 The base 8 addition gives 103327_8. Converting to base 2 gives $001\ 000\ 011\ 011\ 010\ 111_2$. Regrouping using sets of 4 digits gives $1000\ 0110\ 1101\ 0111_2$. This converts to $86D7_{16}$.	7. $86D7_{16}$ or 86D7
8. (ADD (SUB 4 5) (ADD 6 3) (MULT 4 8)) simplifies to (ADD –1 9 32) = 40	8. 40
9. f (7) = f (5) + 2 = 7 + 2 = 9 f (5) = f (3) + 2 = 5 + 2 = 7 f (1) = 1 + 2 = 3	9. 9
10. f (7,4) = 4 – f (2,6) = 4 – 7 = –3 f (2,6) = 2 – f (0,5) = 2 – (–5) = 7 f (0,5) = 0 – 5 = –5	10. –3