ACSL

2013 - 2014 **American Computer Science League** **Contest #1**

Junior Division Solutions

1. Recursive Functions

$f(9) = f(8) + 2 * f(7) = -2 + 2*2 = 2$
$f(8) = f(7) + 2 * f(6) = 2 + 2*(-2) = -2$
$f(7) = f(6) + 2 * f(5) = -2 + 2*2 = 2$
$f(6) = f(5) + 2 * f(4) = 2 + 2*(-2) = -2$ Now substitute backwards.

1. 2

2. Recursive Functions

$f(8,14) = f(14,8) - 1 = 14 - 1 = 13$
$f(14,8) = f(12,9) + 2 = 12 + 2 = 14$
$f(12,9) = f(10,10) + 2 = 10 + 2 = 12$
$f(10,10) = (10 + 10) / 2 = 20/2 = 10$
Now substitute backwards.

2. 13

3. Computer Number Systems

Converting each to base 10:
$F1_{16} = 241$
$375_8 = 253$
$10F_{16} = 271$
$264_{10} = 264$
$11111000_2 = 248$ Therefore $10F_{16}$ is the largest.

3. $10F_{16}$ or 10F

4. Computer Number Systems

Convert first to decimal: $101_2 * 3_{10} + 11_{16} - 52_8 / 6_{10}$
$= 5 * 3 + 17 - 42 / 6$
$= 15 + 17 - 7 = 25 = 11001_2$

4. 11001_2 or 11001

5. What Does This Program Do?

The table contains the values of a, b, c, d and e after each line.

a	b	c	d	e
100	10	5	4	2
100	20	5	4	2
5	20	5	4	2
5	20	5	2	2
5	20	15	2	2

a + b * c – d / e = 5 + 20 * 15 – 2 / 2 = 5 + 300 – 1 = 304

5. 304