ACSL

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

Intermediate Division Solutions

1. Recursive Functions

$f(12) = 2 * f(9) - 3 = 2 * 49 - 3 = 95$
$f(9) = 2 * f(6) - 3 = 2 * 26 - 3 = 49$
$f(6) = f(8) + 1 = 25 + 1 = 26$
$f(8) = 2 * f(5) - 3 = 2 * 14 - 3 = 25$
$f(5) = f(7) + 1 = 13 + 1 = 14$
$f(7) = 2 * f(4) - 3 = 2 * 8 - 3 = 13$
$f(4) = 4 + 4 = 8$ Now substitute backwards.

1. 95

2. Recursive Functions

$f(10,2) = f(8,4) + 2 = 38 + 2 = 40$
$f(8,4) = f(6,6) + 2 = 36 + 2 = 38$
$f(6,6) = f(7,5) - 1 = 37 - 1 = 36$
$f(7,5) = f(5,7) + 2 = 35 + 2 = 37$
$f(5,7) = 5 * 7 = 35$
Now substitute backwards.

2. 40

3. Computer Number Systems

$110111_2 = 55$ Sum = 55 + 63 + 58 + 84 = 260
$63_{10} = 63$ Average = 65 = 101_8
$3A_{16} = 58$
$124_8 = 84$

3. 101_8 or 101

4. Computer Number Systems

$178_{16} = 101111000$ 5 1's
$567_8 = 101110111$ 7 1's
$101110110_2 = 101110110$ 6 1's
$565_8 = 101110101$ 6 1's
$377_{10} = 101111001$ 6 1's

4. 567_8

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
10	5	20	1	2
10	5	20	1	2
10	5	20	25	2
10	20	20	25	2
10	8	20	25	2
10	8	20	5	2

So c / (b + e) – d ^ 2 + a / e = 20 / (8 + 2) – 5^2 + 10/2 = -18

5. -18