ACSL

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

Intermediate Division

1. Recursive Functions

Find $f(12)$ given:

$$f(x) = \begin{cases} 2 * f(x-3) - 3 & if\ x > 6 \\ f(x+2) + 1 & if\ 4 < x \le 6 \\ x + 4 & if\ x \le 4 \end{cases}$$

2. Recursive Functions

Find $f(10,2)$ given:

$$f(x,y) = \begin{cases} f(x-2, y+2) + 2 & if\ x > y \\ f(x+1, y-1) - 1 & if\ x = y \\ xy & if\ x < y \end{cases}$$

3. Computer Number Systems

Find the average of the following. Express the answer in octal.

110111_2 63_{10} $3A_{16}$ 124_8

4. Computer Number Systems

Which of the following has the most 1's in its binary representation?

178_{16} 567_8 101110110_2 565_8 377_{10}

5. What Does This Program Do?

What is printed when this program is run?

```
a = 10 : b=5 : c=20 : d=1 : e=2
if a + b > c / e then b = a - b else c = c * e
if a / b = c / b then a = b + 2 * e else d = b ^ 2
if (a > b) and (c > d) then e = d / b else b = a + c / e
if (a + c > d * e) or (b / c = b / (2 * a))  then b = a - e
      else c = b - c
if (a < b) or (c < d) and (b + e = a) then  d = d - c else c = c / a
print c / (b + e) – d ^ 2 + a / e
end
```