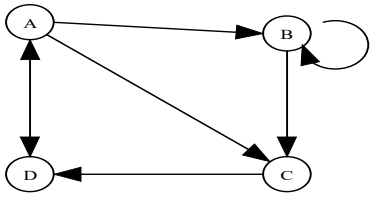
ACSL

2013 - 2014 **American Computer Science League** **Contest #3**

Junior Division Solutions

1. Graph Theory



1. As shown

2. Graph Theory

$$\begin{vmatrix} \mathbf{0} & \mathbf{1} & \mathbf{1} & \mathbf{0} & \mathbf{1} \\ \mathbf{1} & \mathbf{0} & \mathbf{1} & \mathbf{0} & \mathbf{0} \\ \mathbf{1} & \mathbf{0} & \mathbf{1} & \mathbf{1} & \mathbf{0} \\ \mathbf{0} & \mathbf{0} & \mathbf{0} & \mathbf{0} & \mathbf{1} \\ \mathbf{1} & \mathbf{1} & \mathbf{0} & \mathbf{0} & \mathbf{0} \end{vmatrix}$$

2. As shown

3. Boolean Algebra

$A(\overline{A}B + \overline{B}) = A\overline{A}B + A\overline{B} = 0 + A\overline{B} = A\overline{B}$

$A\overline{B} = 1 \rightarrow A = 1 \wedge \overline{B} = 1 \rightarrow A = 1 \wedge B = 0 \rightarrow (1, 0)$

3. (1, 0)

4. Boolean Algebra $X = \overline{A} + B\overline{C} + A(\overline{B} + C)$

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

4. 8

5. What Does This Program Do?

This program changes entries in the table that are divisible by 4, 3, 10 and 2. Then it counts the entries with a value of 1. The final table is:

7	1	1	3
2	11	1	9
7	5	3	1
2	1	27	1

5. 6