ACSL

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

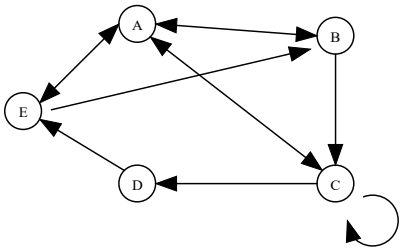
Junior Division

1. Graph Theory

Draw the directed graph containing the following vertices and edges.
Vertices: {A, B, C, D} Edges: {AB, BB, BC, CD, DA, AD, AC}

2. Graph Theory

Write the adjacency matrix for the directed graph.



3. Boolean Algebra

Which ordered pairs make the following Boolean expression TRUE?

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

4. Boolean Algebra

How many ordered triples make the following circuit TRUE?

$$\overline{A} + B\overline{C} + A(\overline{B} + C)$$

5. **What Does This Program Do?**

Given array A below, what is the final value of C after the program is run?

```
C = O
FOR I = 1 TO 4
      FOR J = 1 TO 4
            IF A(I,J)/4 = INT(A(I,J)/4) THEN A(I,J)=A(I,J)/4
            IF A(I,J)/3 = INT(A(I,J)/3) THEN A(I,J)=A(I,J)/3
            IF A(I,J)/10 = INT(A(I,J)/10) THEN A(I,J)=A(I,J)/10
            IF A(I,J)/2 = INT(A(I,J)/2) THEN A(I,J)=A(I,J)/2
      NEXT J
NEXT I
FOR I = 4 TO 1 STEP -1
      FOR J = 1 TO 4
            IF A(I,J) = 1 THEN C = C + 1
      NEXT J
NEXT I
PRINT C
END
```

21	8	4	90
48	44	1	27
70	5	36	10
16	40	81	24

Note: A(1,1) = 16