ACSL

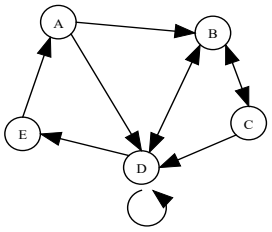
2013 - 2014 **American Computer Science League** **Contest #3**

Intermediate Division

1. **Graph Theory**
Given the directed graph with vertices A, B, C, and D, and directed edges AB, BD, CD, AC, CB, CA, DA, and AD.
Draw the adjacency matrix represented by the directed graph.

1.

2. **Graph Theory**
How many paths of length 2 exist in the following directed graph?



2.

3. **Boolean Algebra**
Which ordered triple(s) make the following Boolean expression TRUE?

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

3.

4. **Boolean Algebra**
How many ordered triples make this Boolean expression TRUE?

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

4.

5. **What Does This Program Do?**
How many of the entries are not zero after this program is run?

```
for a = 1 to 4
    for b = 1 to 4
        c(a,b)=a*b-2*a
    next b
next a
for a = 1 to 4
    for b = 1 to 4
        if c(a,b)<0 then c(a,b)=0
        if c(a,b)/2=int(c(a,b)/2) then c(a,b)=c(a,b)/2
        if c(a,b) < 3 then c(a,b) = 0
    next b
next a
end
```

5.