

## Section 5 Worksheet

### Part 1. Datalog Practice

Consider a graph of colored vertices and undirected edges where the vertices can be red, green, blue. In particular, you have the relations

**Vertex**(**x**, **color**)

**Edge**(**x**, **y**)

The Edge relation is symmetric in that if (x, y) is in Edge, then (y, x) is in Edge.

Your goal is to write a datalog program to answer each of the following questions.

1. Find all green vertices.
2. Find all pairs of blue vertices connected by one edge.
3. Find all triangles where all the vertices are the same color. Output the three vertices and their color.
4. Find all vertices that don't have any neighbors.
5. Find all vertices such that they only have red neighbors.
6. Find all vertices such that they only have neighbors with the same color. Return the vertex and color.
7. For some vertex *v*, find all vertexes connected to *v* by blue vertexes (this one requires recursion).

2. (Midterm 16WI)

Consider the following database about a picture tagging website:

**Member**(mid, name, age)

**Picture**(pid, year)

**Tagged**(mid, pid)

1. Find how many times the most tagged member of the year, younger than 20, was tagged, if for that year there were more than 100 tags for all members younger than 20.

a) (optional) Write a SQL query for the problem.

b) (optional) Write an RA tree for the problem.

2. Write a datalog query with negation that returns the mid's and names of all members that were tagged *only* in pictures where an 'Alice' was also tagged.