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

\[ \text{Vertex}(x, \text{color}) \]
\[ \text{Edge}(x, y) \]

The Edge relation is symmetric in the 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.
   \[ \text{GreenV}(x) : - \text{Vertex}(x, \text{'green'}) \]

2. Find all pairs of blue vertices connected by one edge.
   \[ \text{BluePairs}(x) : - \text{Vertex}(x, \text{'blue'}), \text{Vertex}(y, \text{'blue'}), \text{Edge}(x, y) \]

3. Find all triangles where all the vertices are the same color. Output the three vertices and their shared color.
   \[ \text{Triangle}(x, y, z, a) : - \text{Vertex}(x, a), \text{Vertex}(y, a), \text{Vertex}(z, a), \text{Edge}(x, y), \text{Edge}(y, z), \text{Edge}(z, x) \]

4. Find all vertices that don’t have any neighbors.
   \[ \text{Wrong ANSWER (UNSAFE)} \]
   \[ \text{LonleyV}(x) : - \text{not Edge}(x, \_), \text{not Edge}(\_ , x) \]
   \[ \text{Wrong ANSWER (UNSAFE)} \]
   \[ \text{LonleyV}(x) : - \text{Vertex}(x, \_), \text{not Edge}(x, \_), \text{not Edge}(\_ , x) \]
   \[ \text{Right ANSWER (SAFE)} \]
   \[ \text{OnlyX}(x) : - \text{Edge}(x, \_), \text{not OnlyX}(x) \]
   \[ \text{LonleyV}(x) : - \text{Vertex}(x, \_), \text{not OnlyX}(x) \]

5. Find all vertices such that they only have red neighbors.
   \[ \text{BlueV}(x) : - \text{Vertex}(x, \_), \text{Edge}(x, y), \text{Vertex}(y, \text{'blue'}) \]
   \[ \text{GreenV}(x) : - \text{Vertex}(x, \_), \text{Edge}(x, y), \text{Vertex}(y, \text{'green'}) \]
   \[ \text{RedV}(x) : - \text{Vertex}(x, \_), \text{not BlueV}(x), \text{not GreenV}(x) \]

6. Find all vertices such that they only have neighbors with the same color. Return the vertex and color.
   \[ \text{SameColor}(x, y, a) : - \text{Vertex}(x, a), \text{Vertex}(y, a) \]
   \[ \text{NotSameNeigh}(x) : - \text{Vertex}(x, \_), \text{Edge}(x, y), \text{Edge}(x, z), \text{not SameColor}(y, z) \]
   \[ \text{OnlySameNeigh}(x, a) : - \text{Vertex}(x, a), \text{not NotSameNeigh}(x) \]
   OR
   \[ \text{Neigh}(x, y, a) : - \text{Edge}(x, y), \text{Vertex}(y, a) \]
   \[ \text{DifferentNeigh}(x) : - \text{Neigh}(x, y, a), \text{Neigh}(x, z, b), a != b \]
   \[ \text{OnlySameNeigh}(x, a) : - \text{Vertex}(x, a), \text{not DifferentNeigh}(x) \]

7. (Optional) For some vertex \(v\), find all vertexes connected to \(v\) by blue vertexes (this one require recursion).
   \[ \text{ConnectedTo}(x) : - \text{Vertex}(x, \text{'blue'}), \text{Edge}(x, v) \]
   \[ \text{ConnectedTo}(x) : - \text{Vertex}(x, \text{'blue'}), \text{Edge}(x, y), \text{ConnectedTo}(y) \]