Assignment 1 – View Definitions (Datalog)

Due: Friday, January 21 (in class, after class)

Problem 1 (Family Relations) Consider the following relational schema

EDB = {female/1, male/1, spouse/2, child/2},

IDB = {parent/2, father/2, …}

The EDB relations female(Person), male(Person), spouse(Person, Person), child(Parent, Child) are the ones we assume to be explicitly given (as *facts*). From these EDB relations, new ones (IDB relations) can be derived using Datalog *rules*. For example,

parent(C,P) ← child(P,C).

defines the IDB (=derived) relation parent/2 using the given relation child/2.

a) Using Datalog rules, define the following IDB relations:

- father/2, mother/2,
- brother2/, sister/2,
- aunt/2, uncle/2,
- sister_in_law/2, brother_in_law/2
- cousin/2
- illegitimate/1 (i.e., illegitimate(X) is true if X is a child of parents who are not married to each other)

Whenever not obvious, also give in plain English the definition of aunt/2, cousin/2 etc that you formalized in Datalog. **Hint**: You might want to stick with the narrower definitions (e.g., only 1st cousins, only "direct" aunts/uncles, not grand-uncles, etc.) If you use broader definitions, make sure your English explanation clarifies those.

b) Define the (recursive) relationship ancestor/2 (i.e., ancestor(X,Y) is true if Y is an ancestor of X (parent, grandparent, grand-grandparent, etc.)

c) Can you think of an alternative definition to ancestor/2 above, i.e., which computes ancestor/2 in a different manner? Explain the difference between the two versions (e.g., in terms of evaluation "rounds").

d) Define the (recursive) relation same_generation/2, i.e., same_generation(X,Y) is true if (and only if) X and Y are from the same generation.