Assignment 1 – View Definitions (Datalog)
Due: Friday, January 21 (in class, after class)

Problem 1 (Family Relations) Consider the following relational schema
EBD = {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.