CS180 Database Management Systems - Winter 2003
Homework Assignment 4

Due in class on 25 Feb 2003
(Late homeworks will not be accepted.)

Instructions: Answer all the questions concisely below. Points will be taken off for unnecessarily long answers. Please remember to include your name, student-id number, and email address in your homework submission.

1. Given the following relation schema $R(A, B, C, D)$ and functional dependencies $AB \rightarrow CD$, $B \rightarrow C$, $D \rightarrow A$

(a) Give a smallest instance of R that satisfies the above FDs.

(b) Give a smallest instance of R that does not satisfy the FD $AB \rightarrow CD$.

(c) For each of the following, either prove with Armstrong's axioms or disprove with a counter-example. A counter-example is an instance of R that satisfies all the above functional dependencies but not the one stated below.

(i) $AD \rightarrow B$.

(ii) $BD \rightarrow C$.

2. You are given the parent child relation PC(parent, child) as in Homework 1.

- Write a datalog program to compute the ancestors relation.
- Write a datalog program to compute the siblings relation. Two person are in the siblings relation if they have a common parent. So two persons with the same father (or mother) are siblings.

3. Let Black(x,y) and White(x,y) be two edge relations that represent black and white edges of a graph respectively. Write a datalog program that will compute a the set of pairs (x,y) of vertices such that there exists a path from x to y where black and white edges alternate, starting with a white edge.