Name:____KEY_____

CS 589 Principles of Database Systems
Winter 2011
Quiz 8

No books or notes.

8-A (6 points) Assume an extensional predicate `Flight(C1, C2, AL)` meaning that there is a flight from city `C1` to city `C2` on airline `AL`. Give a Datalog program to define an intensional predicate `RoundTrip(C1, C2, AL1, AL2)` that is true when there is a round trip from city `C1` to city `C2` and back, where the outgoing trip only has flights from airline `AL1` and the incoming trip only has flights from airline `AL2`.

```
Route(C1, C2, AL) :- Flight(C1, C2, AL).
Route(C1, C2, AL) :- Route(C1, C3, AL),
                     Flight(C3, C2, AL).

RoundTrip(C1, C2, AL1, AL2) :-
                     Route(C1, C2, AL1),
                     Route(C2, C2, AL2).
```

8-B. (4 points) For your program, find all facts that match the goal

```
:- RoundTrip(pdx, C2, alaska, united).
```

that can be derived from the extensional database:

```
Flight(pdx, sea, alaska).   Flight(sfo, eug, united).
Flight(pdx, med, alaska).   Flight(sfo, sea, united).
Flight(sea, sfo, alaska).   Flight(eug, pdx, united).
Flight(med, pdx, alaska).   Flight(sea, pdx, united).
```

For the subgoal `Route(pdx, C2, alaska)` *we get*

```
Route(pdx, sea, alaska).
Route(pdx, med, alaska).
Route(pdx, pdx, alaska).  (via med)
Route(pdx, sfo, alaska).  (via sea)
```

For the subgoal `Route(C2, pdx, united)` *we get*

```
Route(eug, pdx, united).
Route(sea, pdx, united).
Route(sfo, pdx, united).  (via eug or sea)
```

So the instances of the original goal that can be derived are

```
RoundTrip(pdx, sea, alaska, united).
RountTrip(pdx, sfo, alaska, united).
```