CSE 462 Homework #1: Relational Model and Relational Algebra

Name: _____ Date: January 31, 2011

***** Due on February 9th, 2011 at the beginning of class. *****

Problem 1. [100pts] Consider the following schema of an online flight reservation agency.

```
Customer(cid, lastName, firstName, dob)
Flight(fid, airline, fromCity, toCity, stops, onTime)
Reservation(cid, fid, date)
```

Attribute `dob` is the customer's date of birth, `stops` is the number of stops (0–??) a flight requires, and `onTime` is a percentage (0-100) indicating how often a flight is on time. Keys are underlined. The set `{lastName, firstName, dob}` *is also a key* for `Customer`. However, the set `{airline, fromCity, toCity, stops, onTime}` *is not a key* for `Flight` since an airline may provide, say, different flights with two stops from Buffalo to Orlando, one stopping in Atlanta and one in New York, both of which are always on time. Attributes `cid` and `fid` in `Reservation` are foreign keys referencing homonymous attributes in `Customer` and `Flight`, respectively.

[10pts] Write a `CREATE TABLE` command for each relation. Include all constraints described above.

[90pts] Write Relational Algebra queries that find:

1. [9pts] `cid`'s of customers who reserved some flight to Boston and some flight to New York.
2. [9pts] `cid`'s of customers who reserved some flight to Miami or some flight to Houston, but not both.
3. [9pts] `cid`'s of customers who reserved some flight to Boston before reserving some flight to New York.
4. [9pts] `cid`'s of customers who only reserved flights from Buffalo or to Buffalo.
5. [9pts] `cid`'s of customers who never reserved AirTran flights or flights to Houston.
6. [9pts] `cid`'s of customers who reserved every flight that is on time at least 85% of the time.
7. [9pts] `cid`'s of customers who reserved every flight that the customer with `cid=5` reserved.
8. [9pts] `cid`'s of customers who reserved at least three distinct JetBlue flights to Miami.
9. [9pts] Pairs of `cid`'s of distinct customers who reserved the same flight and the first in the pair reserved before the second.
10. [9pts] Pairs of `cid`'s of distinct customers who reserved all the same flights. If (c1, c2) is returned, do not return (c2, c1).