CS 143 Homework 3

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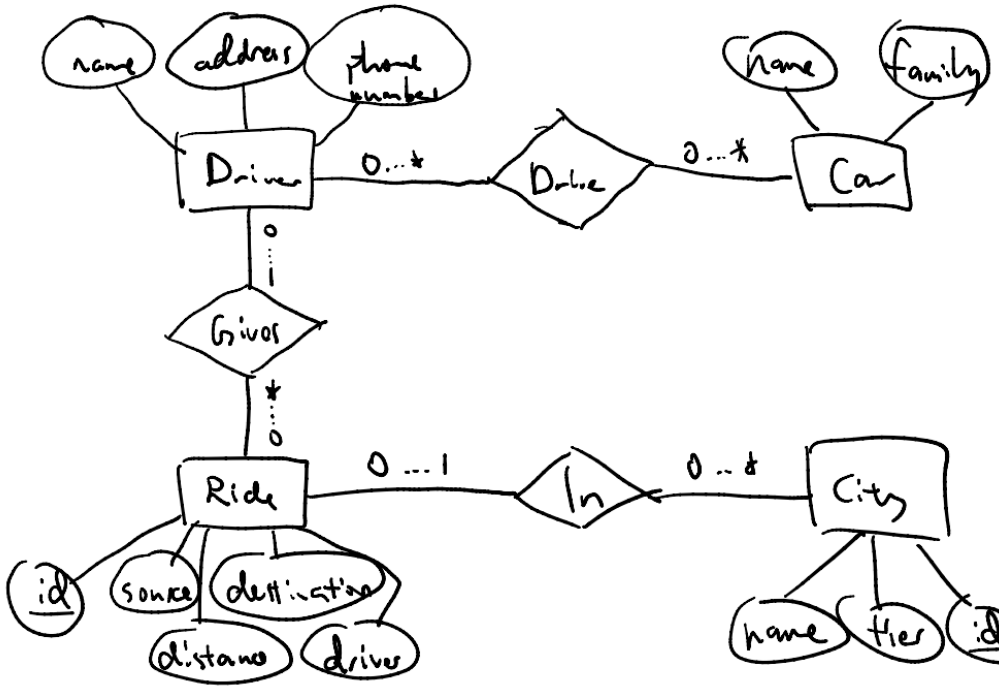
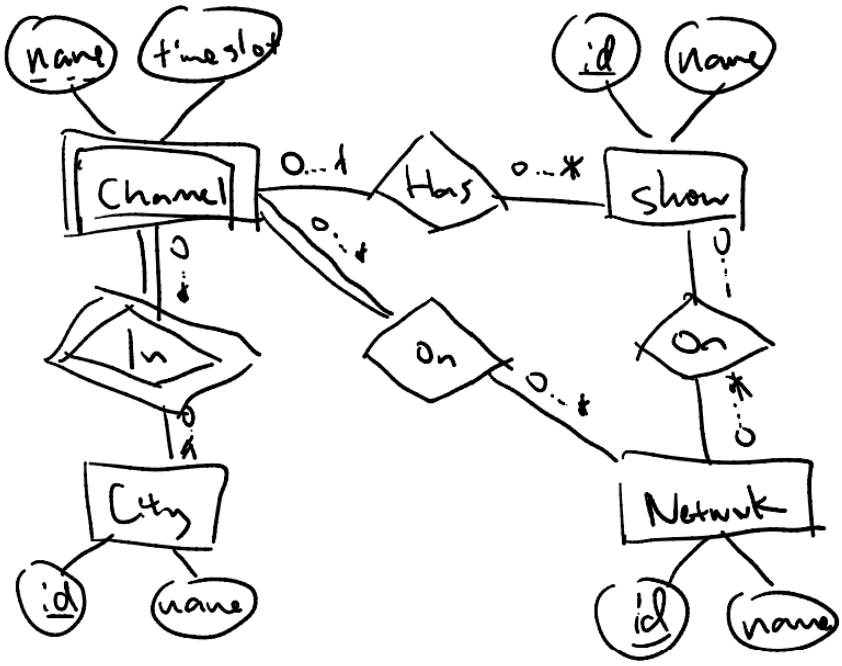
1. (a) As shown below:



(b) CREATE TABLE Driver(name VARCHAR(20), address VARCHAR(100), phone VARCHAR(20));
CREATE TABLE Car(name VARCHAR(20), family VARCHAR(20));
CREATE TABLE City(name VARCHAR(20), tier INT, id INT, PRIMARY KEY(id));
CREATE TABLE Ride(id INT, source VARCHAR(20), destination VARCHAR(20), distance INT, driver VARCHAR(20), PRIMARY KEY(id));

2. As shown below:



3. Programmer(<u>id</u>,name,leader_id)
   Team(<u>leader_id</u>,)
   TeamLeader(<u>id</u>,team_name)
   Project(<u>id</u>,leader_id)

4. Yes because $A \to B \to D$, then with $A \to D$ we have $A \to CD \to E$. Therefore $A \to DE$ so the decomposition is lossless.

5. $BC \to A$, $AC \to B$.

6. (a) $sid \to (dept, cnum)$ and $(dept, cnum) \to sid$ would indicate an one-to-one relationship.
   (b) $(dept, cnum) \to sid$ would indicate a many-to-one relationship.

7. (a) Yes because $A \to B \to D$, then $A \to CD \to E$ so $A \to BCDE$.
   (b) Yes because $B \to D$ then $CD \to E$ and $E \to A$, so $BC \to ADE$.

8. No because F cannot be determined so we would need (A, F) as key, so all the funcitonal dependencies fail the BCNF conditions. It can be normalized into a set of relations as follows:
   $R_0(A, B, C) : A \to BC$
   $R_1(B, D) : B \to D$
   $R_2(C, E) : C \to E$
   $R_3(A, F) :$ (none)