In-class Exercises: BCNF

1. **FD recap.**

   (a) Create an instance of relation $R(A, B, C, D, E)$ that violates this functional dependency: $ABC \rightarrow DE$.

   (b) Suppose we have a relation $R(A, B, C, D, E)$. Does the instance below violate the functional dependency $DB \rightarrow A$?

A	B	C	D	E
5	3	2	1	6
5	3	3	1	2
5	8	4	1	5

2. **Is a relation in BCNF?**

   (a) Suppose we have a relation Students(SID, email, course, term, prof), and that these FDs hold:
   { SID → email;   course, term → prof;   SID, course → grade. }. Is this relation in BCNF?

   (b) Suppose we have a relation Customers(name, DOB, address, favouriteCar, manufacturer) and these FDs hold:
   { name → DOB, favouriteCar;   favouriteCar → manufacturer }. Is this relation in BCNF?

   (c) Suppose we have a relation Parts(part, manufacturer, seller, price) and these FDs hold:
   { part → manufacturer;   part, seller → price }. Is this relation in BCNF?

   (d) Suppose we have a relation R(A, B, C, D, E) and these FDs hold:
   { B → AC;   CB → E;   A → D }. Is this relation in BCNF?

3. **How does BCNF help?** Consider again the relation relation Parts(part, manufacturer, seller, price) with these FDs:
   { part → manufacturer;   part, seller → price }.

   (a) Keeping in mind the FDs, make an instance of this relation that has redundant information.

   (b) If we applied the decomposition step from BCNF decomposition, what attributes would each of the new relations have?

   (c) Project the FDs onto each of the new relations

   (d) Put the same data as in part (a) into your new schema. Is there any redundancy?

   (e) Is it *possible* to create redundancy with this new schema?