Working with Database design and Normalization

1. **Functional dependencies**: For each of the following sets of functional dependencies on a schema r(A, B, C, D, E)
   - Find a candidate key for this schema
   - Find the attribute closure of AB

     1. AB --> C, D --> E, B --> E
     2. A --> CD, B --> DE
     3. AB --> C, C --> D

2. **Normalization 1:** For each of the following set of functional dependencies, decompose relation r into BCNF
     1. AB --> C, D --> E, B --> E
     2. A --> CD, B --> DE
     3. AB --> C, C --> D

3. **Normalization 2:** For each of the following sets of functional dependencies on a schema r(A, B, C, D, E),
   - Find the canonical cover by eliminating all extraneous attributes
   - Decompose relation r into 3NF based on the canonical cover

     1. A --> CD, B --> DE, C --> D
     2. A --> B, B --> C, A --> C, D --> E, B --> E, AD --> E

4. **Real life example:** Consider a database
   student(ID, name, courseID, year, semester, grade)
   instructor(ID, name, deptname, deptbudget)
   List the functional dependencies you would expect to hold on the above relations, and decompose them into BCNF.