**Lab 3: Normalization Process**

Complete the following exercises off-platform. This is ungraded and for your own learning. Write down your answers ....

**Identify Normalization Form:**

You have identified the special functional dependencies in Lab2. Now you learned how to determine the normalization form of a relation based on the presence of the special functional dependencies. Revisit the following relations in Lab 2 and determine the Normal Form they are in:

**Relation 1**

Which normal form is the relational model below?

Assignments(A, B, C, D, E, F, G, H, I, J, K, L, N, Q)

fd1: A, B, C -> D, E, F, G, H, I, J, K, L, N, Q

**Answer**: **~~unnormalized form~~.**

* + **It is in 1NF since it is a relation.**
  + **It is in 2NF too since there is no partial FD.**
  + **It is in 3NF since there is no transitive FD.**

**Relation 2**

Which normal form is the relational model below?

Assignments(A, B, C, D, E, F, G, H, I, J, K, L, N, Q)

fd1: A, B, C -> D, E, F, G, H, I, J, K, L, N, Q

fd2: D -> L, N, Q

fd3: L -> N

**Answer:**

* **It is in 1NF since it is a relation**
* **It is in 2NF too since there is no partial FD.**
* **It is NOT in 3NF, since there is a transitive FD: A, B, C** 🡪 **D, and D** 🡪 **L.**

**Relation 3**

Which normal form is the relational model below?

Assignments(A, B, C, D, E, F, G, H, I, J, K, L, N, Q)

fd1: A, B, C -> D, E, F, G, H, I, J, K, L, N, Q

fd2: A -> D, E, F, L, N, Q

fd3: B, C -> G, H

fd4: D -> L, N, Q

fd5: L -> N

**Answer**:

* + **It is in 1NF since it is a relation.**
  + **It is NOT 2NF since there are partial functional dependencies** 
    - **(A -> D, E, F, L, N, Q and B, C -> G, H)**
  + **It is NOT 3NF since there are transitive FDs.**
    - **A, B, C 🡪 D, and D 🡪 L, N, Q**
    - **D 🡪 L, and L 🡪N**

**Relation 4**

Which normal form is the relational model below?

CustomerContact (FirstName, LastName, DoB, Email, Zodiac, Street, County, City, State, Zip, Company, CompanyInfo)

fd1: FirstName, LastName, DoB -> Email, Zodiac, Street, County, City, State, Zip, Company, CompanyInfo

fd2: LastName, DoB → Email

fd3: DoB → Zodiac

fd4: Zip → City, State

fd5: Company → CompanyInfo

**Answer**:

* **It is in 1NF since it is a relation.**
* **It is NOT in 2NF since there is a partial FD: DoB is a part of (FirstName, LastName, DoB) 🡪 Zodiac**

**Normalization Process:**

**Relational Model 1**

Given the relational model below, normalize it to 3NF. Make sure you list the Functional Dependencies along with each relation, and include all relations (each relation with its functional dependencies) in the summary.

Customers (CID, FirstName, LastName, Email, Address, Company, CompanyInfo)

FD1: CID → FirstName, LastName, Email, Address, Company, CompanyInfo

FD2: Company → CompanyInfo

**Answer**:

**Relation R (CID, FirstName, LastName, Email, Address, Company (fk):**

**Fd1: CID🡪 FirstName, LastName, Email, Address, Company (fk), CompanyInfo**

**Relation R2 (Company, CompanyInfo):**

**FD1: Company 🡪 Company Info**

**Relational Model 2**

Given the relational model below, normalize it to 3NF. Make sure you list the Functional Dependencies along with each relation, and include all relations (each relation with its functional dependencies) in the summary.

CustomerContact (FirstName, LastName, DoB, Email, Zodiac, Street, County, City, State, Zip, Company, CompanyInfo)

fd1: FirstName, LastName, DoB →  Email, Zodiac, Street, County, City, State, Zip, Company, CompanyInfo

fd2: LastName, DoB → Email

fd3: DoB → Zodiac

fd4: Zip → City, State

fd5: Company → CompanyInfo

**Answer**:

**Relation R (FirstName, LastName (fk), DoB (fk), Email, Zodiac, Street, County, City, State, Zip (fk), Company (fk), CompanyInfo):**

**fd1: FirstName, LastName, DoB → Email, Zodiac, Street, County, City, State, Zip, Company, CompanyInfo**

**Relation R2 (LastName, DoB , Email):**

**fd2: LastName, DoB 🡪 Email**

**Relation R3 (DoB, Zodiac):**

**fd3: DoB 🡪 Zodiac**

**Relation R4 (Zip, City, State):**

**fd4: Zip 🡪 City, State**

**Relation R5 (Company, CompanyInfo):**

**fd5: Company 🡪 CompanyInfo**

**Relational Model 3**

Given the relational model below, normalize it to 3NF. Make sure you list the Functional Dependencies along with each relation, and include all relations (each relation with its functional dependencies) in the summary.

Assignments(A, B, C, D, E, F, G, H, I, J, K, L, N, Q)

fd1: A, B, C →  D, E, F, G, H, I, J, K, L, N, Q

fd2: A →  D, E, F, L, N, Q

fd3: B, C →  G, H

fd4: D →  L, N, Q

fd5: L → N

fd6: G → H

**Answer:**

**Assignment (A (fk), B (fk), C (fk), I, J, K):**

**Fd1: A , B, C 🡪 D, E, F, G, H, I, J, K, L, N, Q**

**Relation R2 (A, D (fk), E, F, L, N, Q):**

**Fd2: A 🡪 D, E, F**

**Relation R3 (B, C, G, H):**

**Fd3: B, C 🡪 G**

**Relation R4: (D, L, N, Q)**

**Fd4: D 🡪 L, Q**

**Relation R5 (L, N)**

**Fd5: L 🡪 N**

**Relation R6 (G, H)**

**Fd6: G 🡪 H**