

# Normalization Practice Questions (1NF to 4NF)

## 1. Normalizing a Student Enrollment Table (1NF to 3NF)

### Table Data:

StudentID | StudentName | CoursesEnrolled | Instructor | InstructorEmail

101 | Alice | CSE101, CSE102 | Prof. Smith | smith@uni.edu

102 | Bob | CSE102 | Prof. Lee | lee@uni.edu

### Tasks:

- Identify functional dependencies.
- Check if this table is in 1NF.
- Normalize it up to 3NF.

## 2. Hospital Patient Records (Up to 3NF & BCNF)

### Table Data:

PatientID | PatientName | DoctorID | DoctorName | Specialization | VisitDate

601 | Sam | D101 | Dr. Patel | Cardiology | 2024-03-10

602 | John | D102 | Dr. Lee | Orthopedic | 2024-03-11

601 | Sam | D101 | Dr. Patel | Cardiology | 2024-03-12

### Tasks:

- Identify functional dependencies.
- Check for 1NF, 2NF, and 3NF violations.
- Normalize the table to BCNF.

## 3. Multi-Valued Dependencies (4NF Case - Employee & Skills Table)

### Table Data:

EmployeeID | EmployeeName | Skill | Project

201 | John | Java | Alpha

201 | John | Python | Alpha

201 | John | Java | Beta

202 | Sarah | SQL | Gamma

### Tasks:

- Identify multi-valued dependencies (MVDs).
- Check if this table violates 4NF.
- Normalize it to 4NF.

### Hint:

An employee can have multiple skills. An employee can be assigned to multiple projects. Skills and projects are independent of each other.

## 4. Sports Club Memberships (4NF Case)

### Table Data:

MemberID | MemberName | Activity | Coach

301 | Alice | Tennis | Coach A

301 | Alice | Badminton | Coach B

301 | Alice | Tennis | Coach C

302 | Bob | Basketball | Coach D

**Tasks:**

- Identify multi-valued dependencies.
- Explain if this table violates 4NF.
- Normalize it to 4NF.

**Hint:**

A member can have multiple activities. A member can have multiple coaches. Activities and coaches are independent.

## 5. E-commerce Orders (Up to 4NF)

**Table Data:**

OrderID | CustomerID | Product | PaymentMethod

501 | 301 | Laptop | Credit Card

501 | 301 | Phone | Credit Card

502 | 302 | Tablet | PayPal

502 | 302 | Laptop | PayPal

**Tasks:**

- Identify multi-valued dependencies.
- Check if the table violates 4NF.
- Normalize it to 4NF.

**Hint:**

A customer can order multiple products. A customer can use multiple payment methods. Product and PaymentMethod are independent.