Student Name	Ankita Upadhyay
Student zID	Z1836412
Course Number	CSCI 566
Assignment number	Assignment 2

1. Pharmacy (patient_id, patient_name, address, (Rx_num, trademark_name, generic_name, (date_filled, number_refills_left), number_of_refills)

   Functional Dependencies
   patient_id → patient_name, address
   patient_id, Rx_num → trademark_name, generic_name
   Rx_num → number_of_refills
   Rx_num, date_filled → number_refills_left

   a) is this relation in 1NF? If not, why not? And if not, put it in 1NF

   Ans: No, this relation is not in 1NF as it contains repeating groups (Rx_num, trademark_name, generic_name, (date_filled, number_refills_left), number_of_refills)

   1NF

   Pharmacy (patient_id(PK), patient_name, address, Rx_num(PK), trademark_name, generic_name, date_filled(PK), number_refills_left, number_of_refills)

   b) is this relation in 2NF? If not, why not? And if not, put it in 2NF.

   Ans: No, this relation is not in 2NF as each of its non-prime attributes(no_of_refills) are not are not fully dependent on its primary key (patient_id(PK), Rx_num(PK), date_filled(PK)

   2NF

   Patient (patient_id(PK), patient_name, address)
   Rx_details(patient_id(PK), Rx_num(PK), trademark_name, generic_name)
   Rx_details2(Rx_num(PK), no_of_refills)
   Rx(Rx_num(PK), date_filled(PK), number_refills_left)

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c) is this relation in 3NF? If not, why not? And if not, put it in 3NF.

Ans: Yes, this relation is in 3NF as its non-prime attributes are not transitively dependent.

2. Company (Emp_id, Emp_name, Emp_address, (Project_id, Project_name, Manager_id, Manager_name, hours_worked))

Functional Dependencies
Emp_id → Emp_name, Emp_address, Project_id
Project_id → Project_name, Manager_id, Manager_name
Emp_id, Project_id → hours
Manager_id → Manager_name

a) is this relation in 1NF? If not, why not? And if not, put it in 1NF

Ans: No, this relation is not in 1NF as it contains repeating groups (Project_id, Project_name, Manager_id, Manager_name, hours_worked)

1NF

Company (Emp_id(PK), Emp_name, Emp_address, Project_id(PK), Project_name, Manager_id, Manager_name, hours_worked)

b) is this relation in 2NF? If not, why not? And if not, put it in 2NF.

Ans: No, this relation is not in 2NF as each of its non-prime attributes(Project_name, Manager_id, Manager_name) are not are not fully dependent on its primary key(Emp_id(PK), Project_id(PK))

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2NF

Employee (Emp_id(PK), Emp_name, Emp_address)
Project(Project_id(PK), Project_name, Manager_id, Manager_name)
Emp_Proj(Emp_id(PK), Project_id(PK), hours)

c) is this relation in 3NF? If not, why not? And if not, put it in 3NF.

Ans: No, this relation is not in 3NF as its non-prime attribute Manager_name is transitively dependent.

3NF

Employee (Emp_id(PK), Emp_name, Emp_address)
Project(Project_id(PK), Project_name, Manager_id(FK))
Emp_Proj(Emp_id(PK), Project_id(PK), hours)
Manager (Manager_id(PK), Manager_name)

3. Property (Property_id, county, lot_num, lot_area, price, tax_rate, (date_paid, amount))
Functional Dependencies
Property_id → county, lot_num, area, price, tax_rate, date_paid, amount
area → price
county → tax_rate
date_paid → amount

a) is this relation in 1NF? If not, why not? And if not, put it in 1NF

Ans: No, this relation is not in 1NF as it contains repeating groups (date_paid, amount)

1NF

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Property (Property_id(PK), county, lot_num, lot_area, price, tax_rate, date_paid(PK), amount)

b) is this relation in 2NF? If not, why not? And if not, put it in 2NF.

Ans: No, this relation is not in 2NF as each of its non-prime attributes(county, lot_num, lot_area, price, tax_rate) are not are not fully dependent on its primary key(Property_id(PK), date_paid(PK)

2NF
Property (Property_id(PK), county, lot_num, lot_area, price, tax_rate)
Property_Date_amount(Property_id(PK) date_paid(PK), amount)

c) is this relation in 3NF? If not, why not? And if not, put it in 3NF.

Ans: No, this relation is not in 3NF as its non-prime attribute), county ,area are transitively dependent.

Property (Property_id(PK), county(FK), lot_num, lot_area(FK), date_paid(FK))
Lots(lot_area(PK), price)
County_details(county(PK), tax_rate)
Property_Date_amount(Property_id(PK),date_paid(PK),amount)

4. invoice (invoice_no, invoice_date, cust_name, cust_addr, (pet_name, procedure, amount))

Functional Dependencies
invoice_no → invoice_date, cust_name, cust_addr, pet_name
invoice_no, pet_name → procedure
cust_name → cust_addr

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procedure → amount

a) is this relation in 1NF? If not, why not? And if not, put it in 1NF

Ans: No, this relation is not in 1NF as it contains repeating groups (pet_name, procedure, amount)

1NF

invoice (invoice_no(PK), invoice_date, cust_name, cust_addr, pet_name, procedure, amount)

b) is this relation in 2NF? If not, why not? And if not, put it in 2NF.

Ans: No, this relation is not in 2NF as each of its non-prime attributes are not are not fully dependent on its primary key.

2NF

invoice(invoice_no(PK), invoice_date, cust_name, cust_addr)
invoice_pet(invoice_no(PK), pet_name(PK), procedure, amount)

c) is this relation in 3NF? If not, why not? And if not, put it in 3NF.

invoice(invoice_no(PK), invoice_date, cust_name(FK))
invoice_pet(invoice_no(PK), pet_name(PK),procedure, amount)
customer(cust_name(PK),cust_addr)