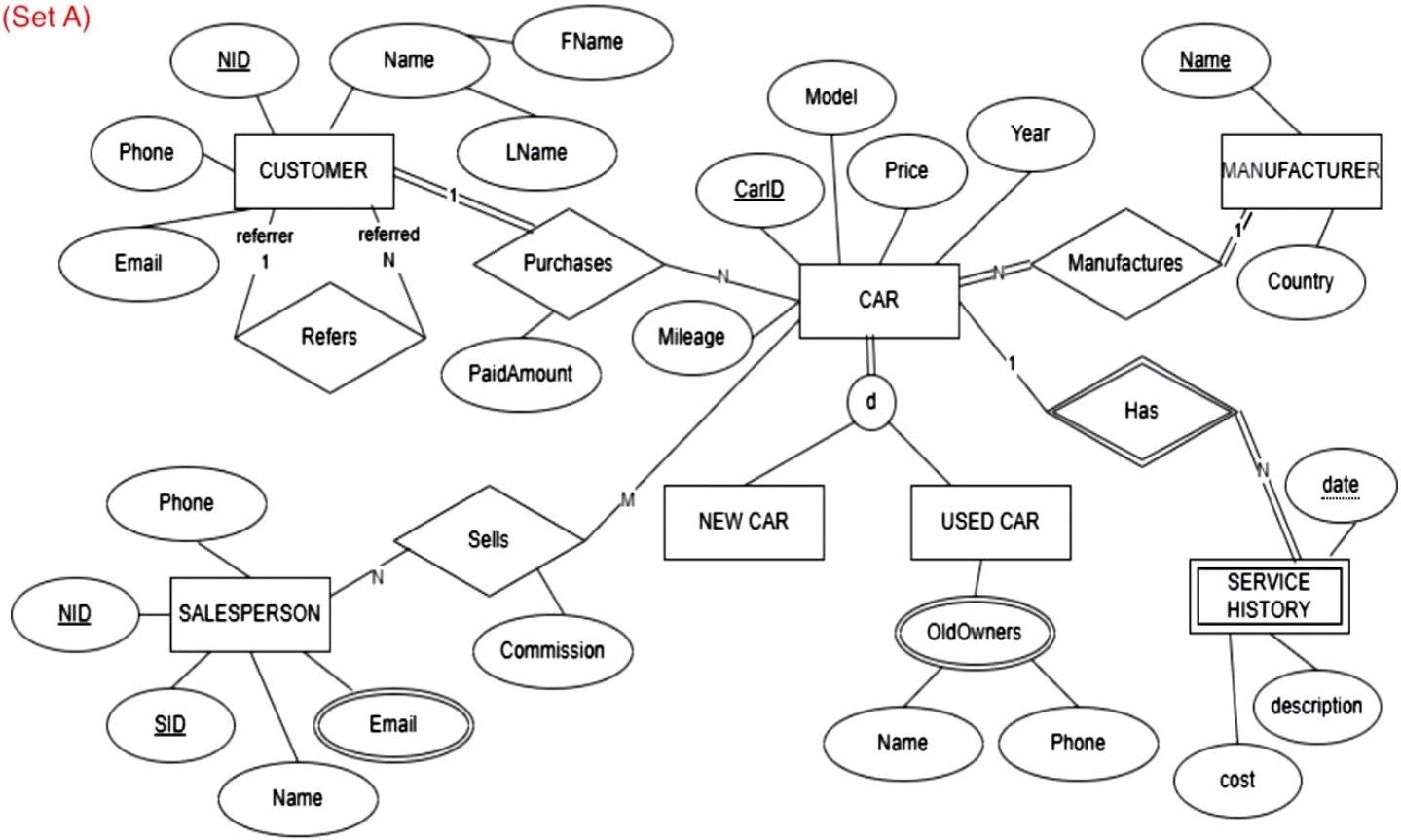
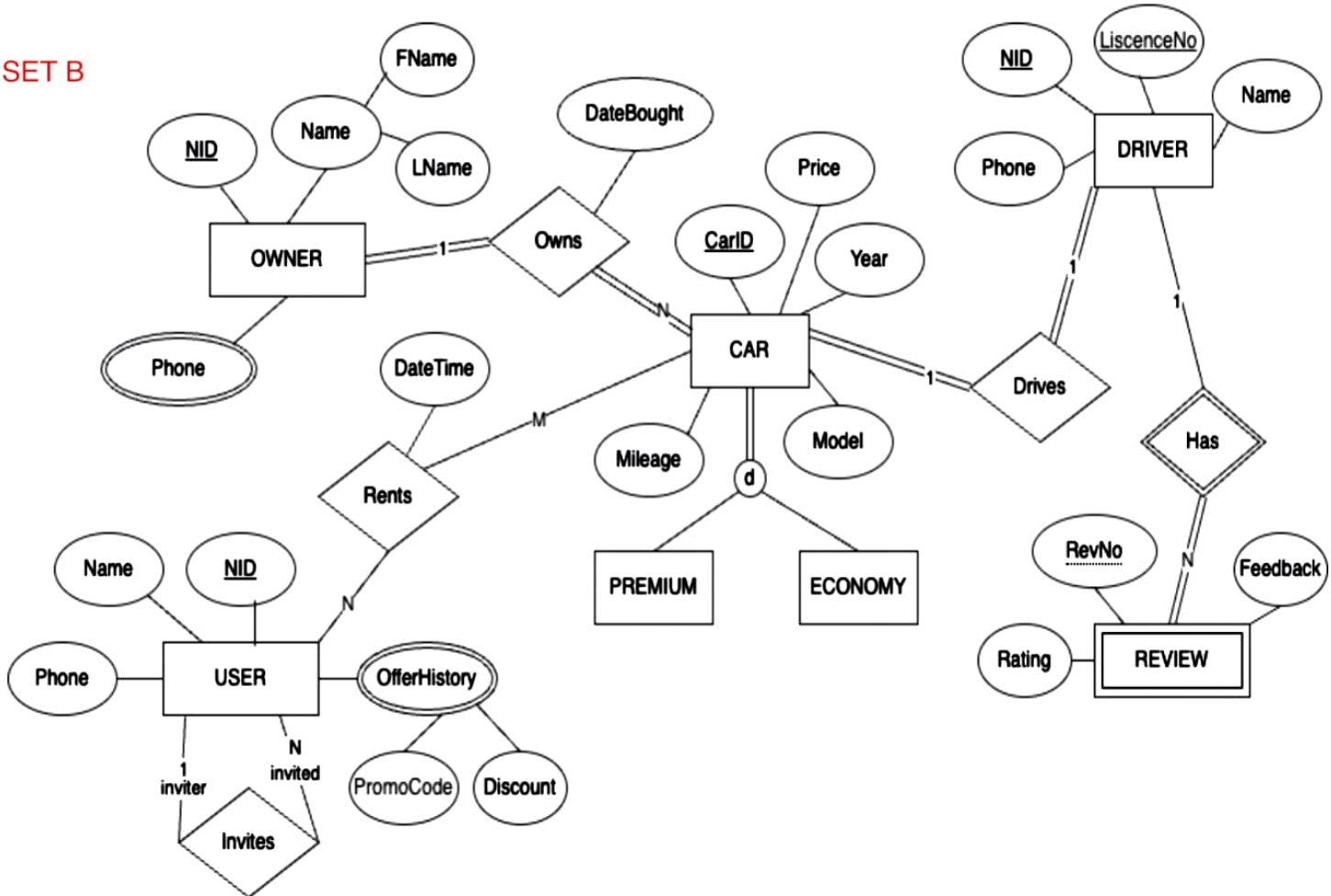
**Question 1: Construct** a relational schema diagram from the Extended Entity Relationship (EER) diagram below. If multiple options are available for mapping any part of the diagram, then choose any one of the appropriate options.

Quiz 3 (Set A)



**Question 1: Construct** a relational schema diagram from the Extended Entity Relationship (EER) diagram below. If multiple options are available for mapping any part of the diagram, then choose any one of the appropriate options.

QUIZ 3, SET B



**Question 1:** Consider the following relation: QUIZ 4, SET A [12 Marks]

Blood_Donation( DonorID, PatientID, RequestDate, DName, DPhone, DEmail , PName, PContact, PCondition, EmergencyLevel, DonationDate, DNextAvailability, DonorBadge, TotalDonation)

The primary key of the relation is underlined. The relation has the following additional functional dependencies:
FD1: DonorID → DName, DPhone, DEmail, DonorBadge, TotalDonation
FD2: PatientID → PName, PContact
FD3: PatientID, RequestDate → PCondition, EmergencyLevel
FD4: DonationDate → DNextAvailability
FD5: TotalDonation → DonorBadge

a. Explain if the above relation in first normal form (1NF) or not? If not, **apply** 1NF normalization.
b. Explain if the above relation is in second normal form (2NF) or not? If not, **apply** 2NF normalization.
c. Explain if the relations in (b) are in third normal form (3NF) or not? If not, **apply** 3NF normalization.

**Question 2:** Consider the following relation R: R ( A, B, C, D, E, F) [8 Marks]
The primary key of the relation is underlined. The relation has the following additional functional dependencies:
B, C→ D
E→F
Identify and explain which Normal Form the Relation R is in. Normalize step by step up to 3NF.

QUIZ 4, SET B

**Question 1:** Consider the following relation: [12 Marks]
Music_Bank( SingerID, AlbumID, SongID, SingerName, SPhone, SEmail , AName, MusicLabel, LabelAddress, RecordDate, ReleaseDate, PayAmount, SongTitle, Genre, BandID, BandName, BMgrPhone)

The primary key of the relation is underlined. The relation has the following additional functional dependencies:
FD1: SingerID → SingerName, SPhone, SEmail, BandID, BandName, BMgrPhone
FD2: AlbumID → AName, ReleaseDate, MusicLabel, LabelAddress
FD3: AlbumID, SongID → SongTitle, Genre
FD4: BandID → BandName, BMgrPhone
FD5: MusicLabel → LabelAddress

a. Explain if the above relation in first normal form (1NF) or not? If not, **apply** 1NF normalization.
b. Explain if the above relation is in second normal form (2NF) or not? If not, **apply** 2NF normalization.
c. Explain if the relations in (b) are in third normal form (3NF) or not? If not, **apply** 3NF normalization.

**Question 2:** Consider the following relation R: R ( P, Q, S, T, U, V) [8 Marks]
The primary key of the relation is underlined. The relation has the following additional functional dependencies:
Q→S
T, U→V
Identify and explain which Normal Form the Relation R is in. Normalize step by step up to 3NF.

**Question 1:** Consider the following relation: [12 Marks]
CUSTOMER_ORDER( OrderID, CustomerID, ProductID, OrderDate, quantity, details, cName, cAddress, pName, discountPercentage, unitPrice, pointsEarned, offer, deliveryDate)

The primary key of the relation is underlined. The relation has the following additional functional dependencies:
FD1: CustomerID → cName, cAaddress
FD2: ProductID → pName, details, unitPrice
FD3: OrderID, ProductID → quantity, offer
FD4: OrderID , CustomerID → orderDate, deliveryDate, discountAmount
FD5: orderDate → discountPercentage

a. Explain if the above relation in first normal form (1NF) or not? If not, **apply** 1NF normalization.
b. Explain if the above relation is in second normal form (2NF) or not? If not, **apply** 2NF normalization.
c. Explain if the relations in (b) are in third normal form (3NF) or not? If not, **apply** 3NF normalization.

**Question 2:** Consider the following relation R: R ( P, Q, S, T, U, V) [8 Marks]
The primary key of the relation is underlined. The relation has the following additional functional dependencies:
Q, S → T
U→V
Identify and explain which Normal Form therelation R is in. Normalize step by step up to 3NF.

QUIZ 4, SET D

**Question 1:** Consider the following relation: [12 Marks]

Pokemon_Battles (Battle_id, Trainer_id, Pokemon_id, Battle_name, Trainer_Name, bdate, pokemon_name, type, weakness, effectiveness, score, Trainer_age, location, evolved_from, DateCaught, NumberBattles)

The primary key of the relation is underlined. The relation has the following additional functional dependencies:

FD1: Battle_id → Battle_name, bdate, location
FD2: Trainer_id → Trainer_Name, Trainer_age
FD3: Pokemon_id → pokemon_Name, type, weakness, effectiveness, evolved_from
FD4: Trainer_id, Pokemon_id → DateCaught, NumberBattles
FD5: type → weakness, effectiveness

a. Explain if the above relation in first normal form (1NF) or not? If not, **apply** 1NF normalization.
b. Explain if the above relation is in second normal form (2NF) or not? If not, **apply** 2NF normalization.
c. Explain if the relations in (b) are in third normal form (3NF) or not? If not, **apply** 3NF normalization.

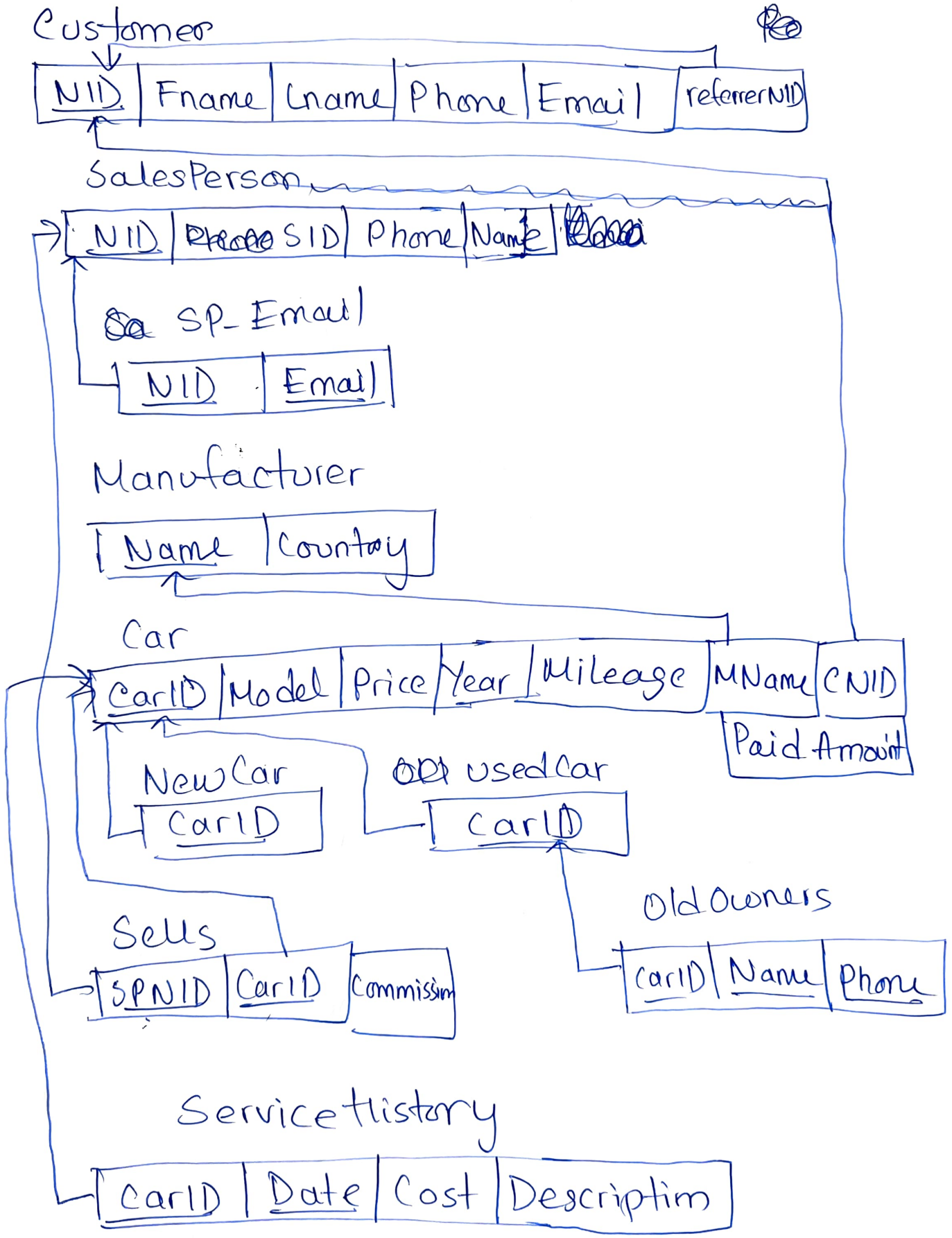
**Question 2:** Consider the following relation R: R ( A, B, C, D, E, F) [8 Marks]

The primary key of the relation is underlined. The relation has the following additional functional dependencies:

B→ C
D E→F

Identify and explain which Normal Form the Relation R is in. Normalize step by step up to 3NF.

# Quiz 3 (Set A)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Fname
Lname
Phone
Email
referrerNID
SalesPerson
NID
SID
Phone
Name
SP_Email
NID
Email
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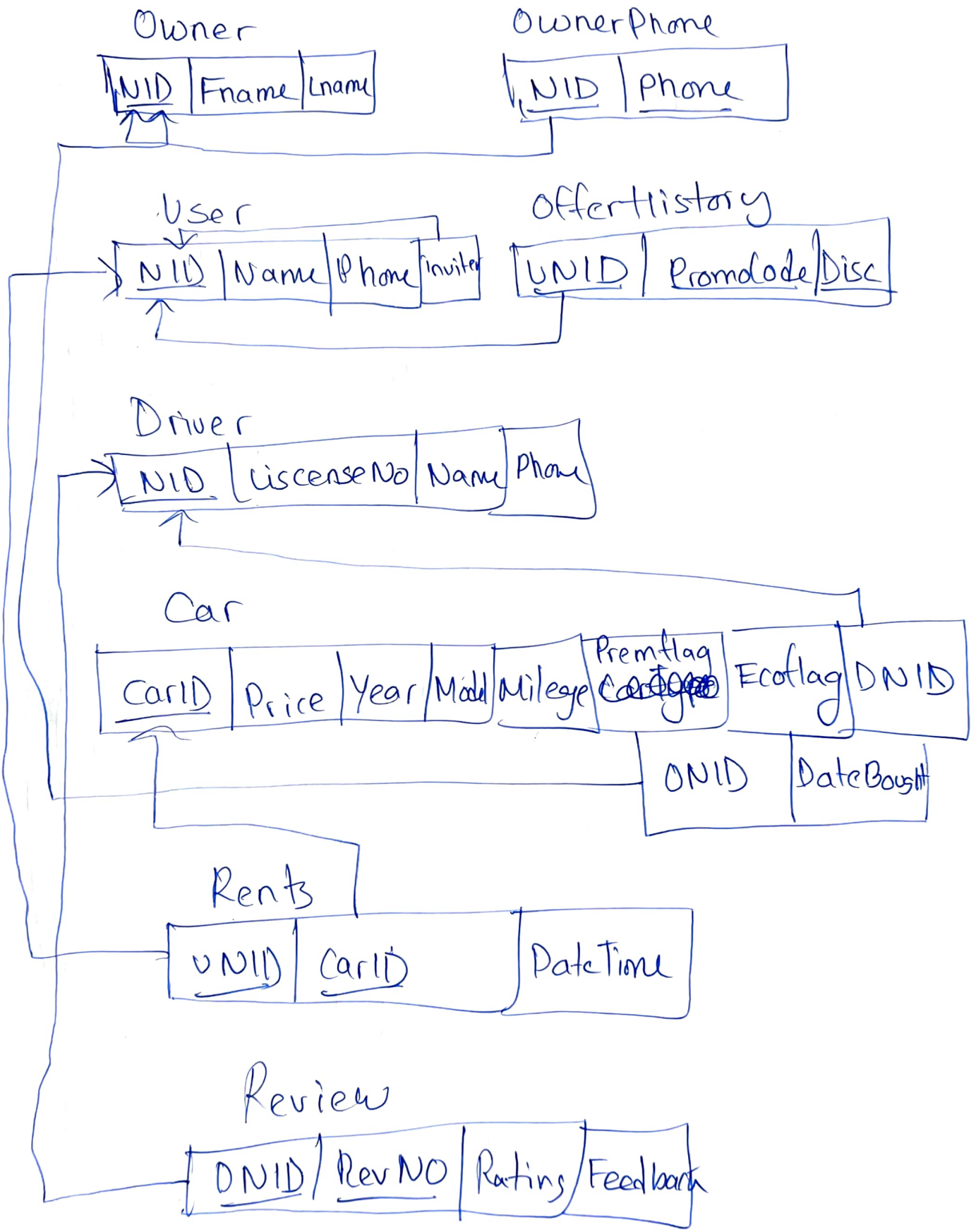
Name
Country
Car
CarID
Model
Price
Year
Mileage
MName
CNID
Paid Amount
NewCar
CarID
usedCar
CarID
Sells
SPNID
CarID
Commission
OldOwners
carID
Name
Phone
ServiceHistory
CarID
Date
Cost
Description

# Quiz 3 (set B)


Owner
NID
Fname
Lname
OwnerPhone
NID
Phone
User
NID
Name
Phone
Invited
OfferHistory
UNID
PromoCode
Disc
Driver
NID
LicenseNo
Name
Phone
Car
CarID
Price
Year
Model
Mileage
PremFlag
EcoFlag
DNID
DNID
DateBought
Rents
UNID
CarID
DateTime
Review
DNID
RevNO
Rating
Feedback

# Quiz 4 (set A)

## Question 1

a. In 1NF. No multivalued/composite attributes & no nested table present.

b. Not in 2NF. Partial dependency on pk exists due to FD1, 2, 3.

2NF Normalization

Donor (DonorID, Dname, DPhone, DEmail, DonBadge, TotalDon)

Patient (PatientID, PName, Pcontact)

Requests (PatientID, RequestDate, Pcondition, Emergency)

Blood-Donation (DonorID, PatientID, ReqDate, DonDate, Dnext Avail)

c. Not in 3NF. Transitive Dependency exists in Donor & Blood-Donation tables due to FD5 and FD4 respectively.

3NF Normalization

Patient & Request remain unchanged.

Donor (DonorID, Dname, DPhone, DEmail, TotalDon)

Badges (TotalDon, DonBadge)

Blood-Donation (DonorID, PatientID, ReqDate, DonDate)

Availability (DonDate, Dnext Avail)

## Question 2

R is in 2NF since already in 1NF & no partial dependency. It's in 1NF as no multivalued/composite attribut or no nested tables present.

3NF normalization: $R_1$ (A, B, C, E)

$R_2$ (B, C, D)

$R_3$ (E, F)

# Quiz 4 (set B)

## Question 1

a. In 1NF. No multivalued/composite attribute & no nested table.

b. Not in 2NF. Partial Dependency on pk due to FD1, 2, 3.

2NF Normalization

Singer(SingerID, Sname, Sphone, SEmail, BandID, BandName, BMgrPhone)

Album(AlbumID, Aname, ReleaseDate, MusicLabel, LabAddress)

Songs(AlbumID, SongID, songtitle, Genre)

MusicBank(SingerID, AlbumID, SongID, RecordDate, PayAmt)

c. Not in 3NF. Transitive Dependency due to FD4 & FD4 in Singer & Album tables.

~~Song & M~~ 3NF Normalization

Song & MusicBank remain unchanged

Singer(SingerID, Sname, Sphone, semail, BandID)

Bands(BandID, BandName, BMgrPhone)

Album(AlbumID, Aname, ReleaseDate, MusicLabel)

Label(MusicLabel, LabelAddress)

## Question 2

It is in 2NF. Already in 1NF since no multivalued or composite attributes or nested tables. Also no partial dependency on pk.

3NF Normalization: $R_1(P, Q, T, U)$

$R_2(Q, S)$, $R_3(T, U, V)$

# Quiz 4 (set C)

## Question 1

a. It is in 1NF as there are no multivalued/composite attribute or any nested tables.

b. Not in 2NF as the relation has partial dependency on primary key due to FD1, 2, 3, 4

2NF normalization

Customer | CustID | cname | cAddress

Product | ProdID | PName | details | UnitPrice

Prod_order | orderID | ProdID | quantity | offer

Cust_order1 | OrdID | CustID | orderDate | deliveryDate | discPerc

Cust_order2 | orderID | CustID | ProdID | PointsEarned

c. Not in 3NF as there is transitive dependency in cust_order1 table due to FD5.

3NF Normalization

Customer, Product, Prod_order, Cust_order2 remain unchanged.

Cust_order1 | OrdID | CustID | orderDate | DeliverDate

Discounts | orderDate | DiscPerc

## Question 2

It is in 2NF. To be in 2NF, must be in 1NF & cannot have partial dependencies. There are no multivalued/composite attribute or nested table so it is in 1NF, also no partial dependency.

3NF Normalization

$R_1$ | P | Q | S | U

$R_2$ | Q | S | T

$R_3$ | U | V

# Quiz 4 (Set D)

## Question 1

a. It is in 1NF. The relation has no multivalued/composit attribut or nested relations.

b. It is not in 2NF as there are partial dependencies in the table due to FD1, FD2, FD3 & FD4

2NF normalization

Battle (Battle_id, Battle-name, bdate, Location)

Trainer (Trainer_id, Trainer_name, Trainer_age)

Pokemon (Pok_id, pok-name, type, weakness, effectiveness, evolved_from)

Trainer_Pok (TrainerID, Pok-id, datecaught, NumberBattles)

Pok-Battles (Battle-id, Trainer_Id, Pok-id, score)

c. The schema is not in 3NF as there ~~are~~ is transitive dependency in 'Pokemon' table due to FD5.

Battle, Trainer, Trainer_Pok, Pok_Battles tables will remain the same as 2NF.

Pokemon (Pok_id, pokname, type, evolved_from)

Pok-type (Type, weakness, effectiveness)

## Question 2

The relation R is in 2NF. To be in 2NF it must first be in 1NF which it is since no multivalued/composite attribute or nested tables exist. Also there are no partial dependencies on the primary key. So it is in 2NF.

3NF normalization: $R_1$ (A ; B, D, E)

$R_2$ (B, C) $R_3$ (D, E, F)