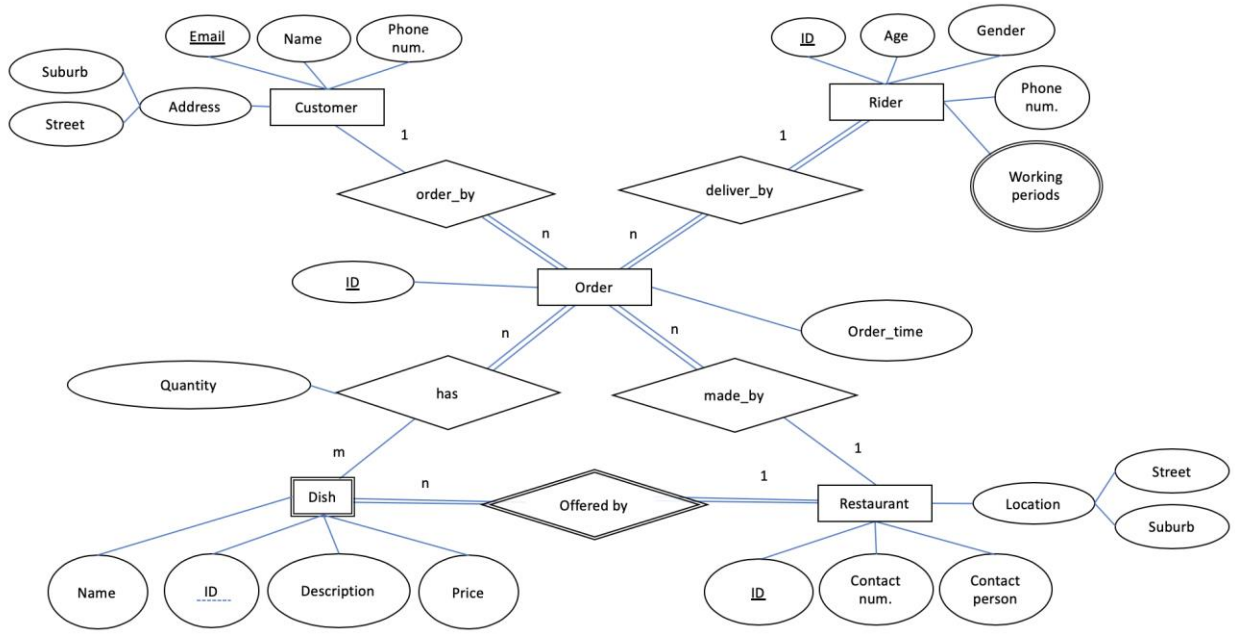
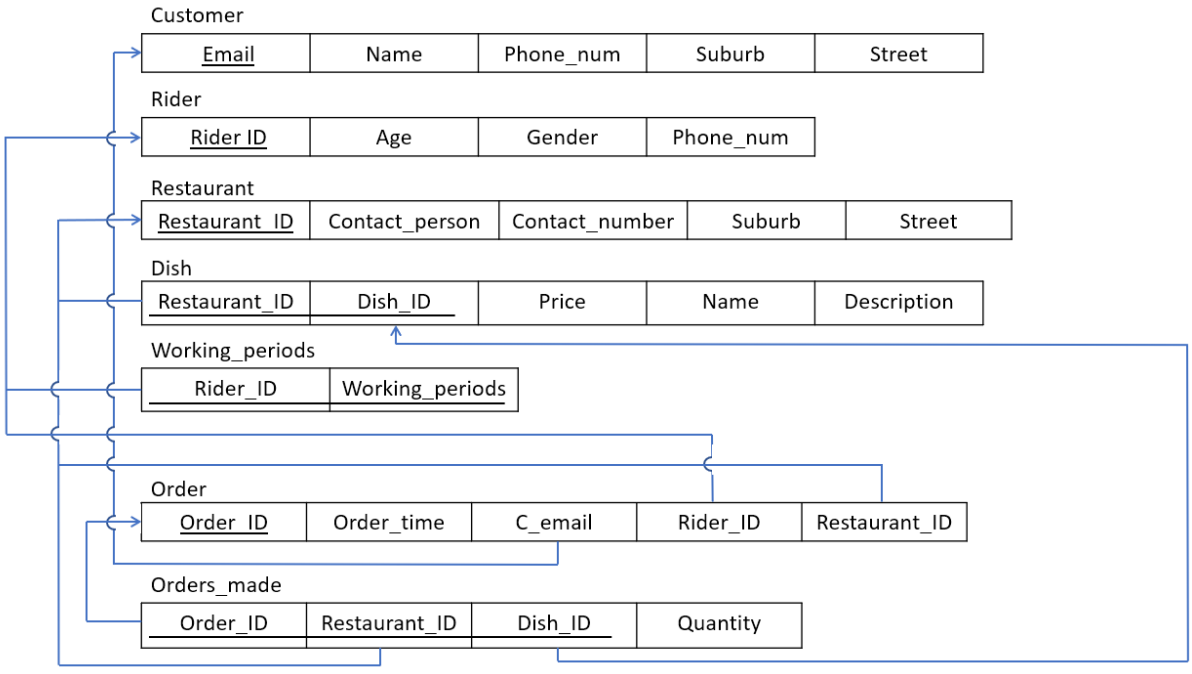
Q1:


Email
Name
Phone num.
Suburb
Address
Street
Customer
1
order_by
n
ID
Age
Gender
Rider
Phone num.
Working periods
1
deliver_by
n
ID
Order
Order_time
n
n
Quantity
has
made_by
m
1
Dish
n
Offered by
1
Restaurant
Location
Street
Suburb
Name
ID
Description
Price
ID
Contact num.
Contact person

Q2:


Customer
Email
Name
Phone_num
Suburb
Street
Rider
Rider ID
Age
Gender
Phone_num
Restaurant
Restaurant_ID
Contact_person
Contact_number
Suburb
Street
Dish
Restaurant_ID
Dish_ID
Price
Name
Description
Working_periods
Rider_ID
Working_periods
Order
Order_ID
Order_time
C_email
Rider_ID
Restaurant_ID
Orders_made
Order_ID
Restaurant_ID
Dish_ID
Quantity

Q3:

1):

$R_0 = GenreOfSong \bowtie Song \bowtie SongCreating \bowtie Artist$

$\pi_{\{title\}}(\sigma_{(name='Taylor\ Swift'\ AND\ genre='pop'\ AND\ role='composer')}R_0)$

2):

$R_0 = Song \bowtie SongCreating \bowtie Artist$

$R_1 = \pi_{\{sID,\ title\}}(\sigma_{(name='Taylor\ Swift'\ AND\ role='composer')}R_0)$

$R_2 = \pi_{\{sID,\ title\}}(\sigma_{(name='Ed\ Sheeran'\ AND\ role='composer')}R_0)$

$R_3 = \pi_{\{title\}}(R_1 \cup R_2)$

3):

$R_0 = Artist \bowtie SongCreating \bowtie GenreOfSong \bowtie JoinIn$

$R_1 = R_0 \bowtie_{(R_0.cID=Company.cID)} Company$

$R_2 = \pi_{\{aID,\ artist.name\}}(\sigma_{(gender='female'\ AND\ company='Universal\ Music\ Group'\ AND\ genre='pop')}R_1)$

$R_3 = \pi_{\{aID,\ artist.name\}}(\sigma_{(gender='female'\ AND\ company='Universal\ Music\ Group'\ AND\ genre='hip-hop')}R_1)$

$R_4 = \pi_{\{artist.name\}}(R_2 - R_3)$

Note:

1. Join, difference, division or intersection without primary key is usually incorrect as any non-pk attribute can have duplicate records. For instance, R2, R3 must contain aID since there may exist two people with the same name in R2 and R3, and the difference operation will remove the person in R2 even the person in R3 is not him/her.
2. It is incorrect to use genre='pop' and genre<>'hip-hop' in the condition. This is because the condition is applied to a single instance, you can only find all the pop song in this circumstance.

4):

$R_0 = Artist \bowtie SongCreating \bowtie GenreOfSong$

$R_1 = \pi_{\{aID,\ name,\ genre\}}R_0 \div \pi_{\{genre\}}GenreOfSong$

$R_2 = \pi_{\{sID\}}(\sigma_{(name='Taylor\ Swift')}R_0)$

$$R_3 = \pi_{\{aID,\ name\}}(\sigma_{(name \neq 'Taylor\ Swift')} R_0 \bowtie R_2)$$

$$R_4 = \pi_{\{name\}}(R_1 \cap R_3)$$

Note:

1. To get R1, the division should first exclude song id. Otherwise, the meaning of the division is to get all the (artist, song) pairs with all the genre, and it's nearly impossible to find a single song with all genres.