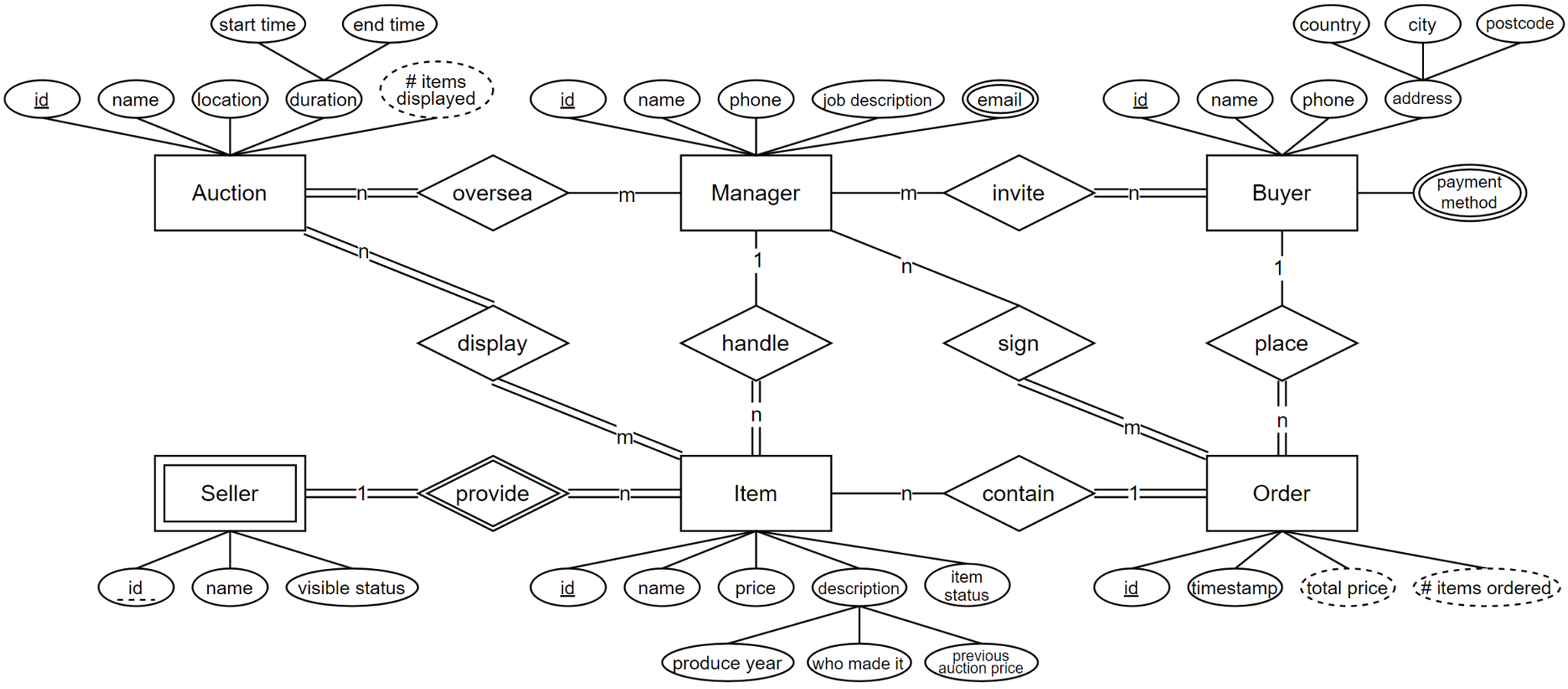
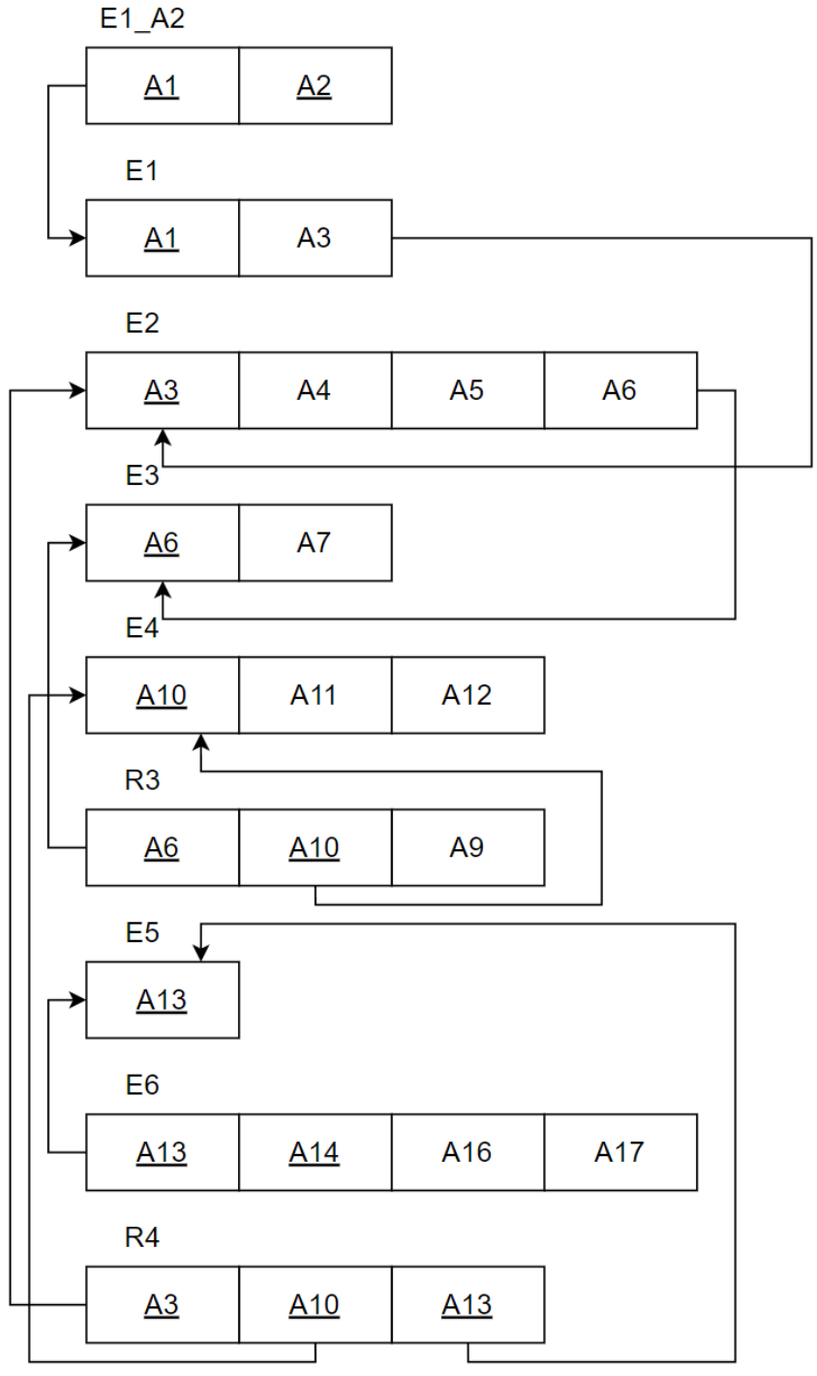
Question 1


start time
end time
id
name
location
duration
items displayed
Auction
n
oversea
m
Manager
id
name
phone
job description
email
m
invite
n
Buyer
id
name
phone
address
country
city
postcode
payment method
n
display
1
handle
n
sign
1
place
m
n
m
n
Seller
1
provide
n
Item
n
contain
1
Order
id
name
visible status
id
name
price
description
item status
produce year
who made it
previous auction price
id
timestamp
total price
items ordered

Question 2


E1_A2
A1
A2
E1
A1
A3
E2
A3
A4
A5
A6
E3
A6
A7
E4
A10
A11
A12
R3
A6
A10
A9
E5
A13
E6
A13
A14
A16
A17
R4
A3
A10
A13

Question 3

1)

$$\pi_{\{Model\}}(\sigma_{status=available \wedge year<2000}\ Car \bowtie \sigma_{Country = Germany}\ Make)$$

2)

$$R1 = \sigma_{rate>4.5} Salesperson \bowtie \sigma_{Country = Germany}\ (Make \bowtie Car) \bowtie \sigma_{salePrice>100000 \wedge saleYear = 2021}\ Sale$$

$$R2 = \pi_{\{salpName\}}(\sigma_{count(carID) > 15}(\gamma_{salpID,count(carID)}\ R1))$$

3)

$$R1 = (\pi_{\{carID\}}(\sigma_{bodyType=sedan}\ (Car \bowtie Sale))) \cap (\pi_{\{carID\}}(\sigma_{(2024-foundedYear)>50}\ (Car \bowtie Make)))$$

$$R2 = \pi_{\{carID\}}(\sigma_{count(serID) > 10}(\gamma_{carID,count(serID)}(\sigma_{sYear\geq 2019}\ Service)))$$

$$R3 = \pi_{\{cusName\}}(Customer \bowtie Sale \bowtie (R1 \cap R2))$$

4)

$$R1 = \pi_{\{salpID\}}(\sigma_{Country \neq Germany \wedge saleYear= 2024}\ (Make \bowtie Car \bowtie Sale \bowtie Salesperson))$$

$$R2 = \pi_{\{salpID\}}\ (\sigma_{rate >4.8 \wedge saleYear= 2024}\ (Make \bowtie Car \bowtie Sale \bowtie Salesperson))$$

$$R3 = \pi_{\{salpID\}}\ (\sigma_{bodyType=SUV}\ (Car \bowtie Sale \bowtie Salesperson))$$

$$R4 = \pi_{\{salpName\}}((R2 - R1 - R3) \bowtie Salesperson)$$