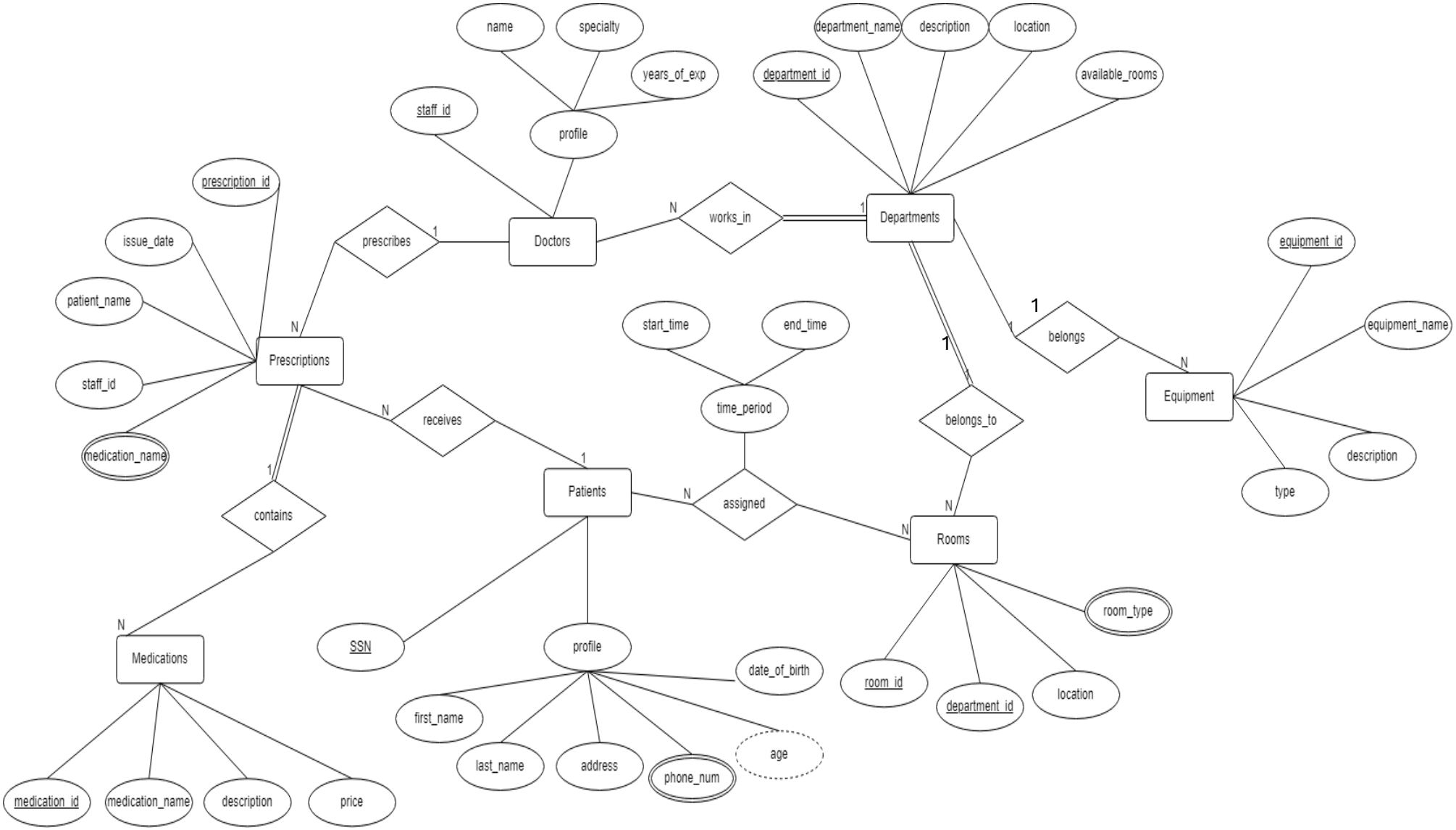
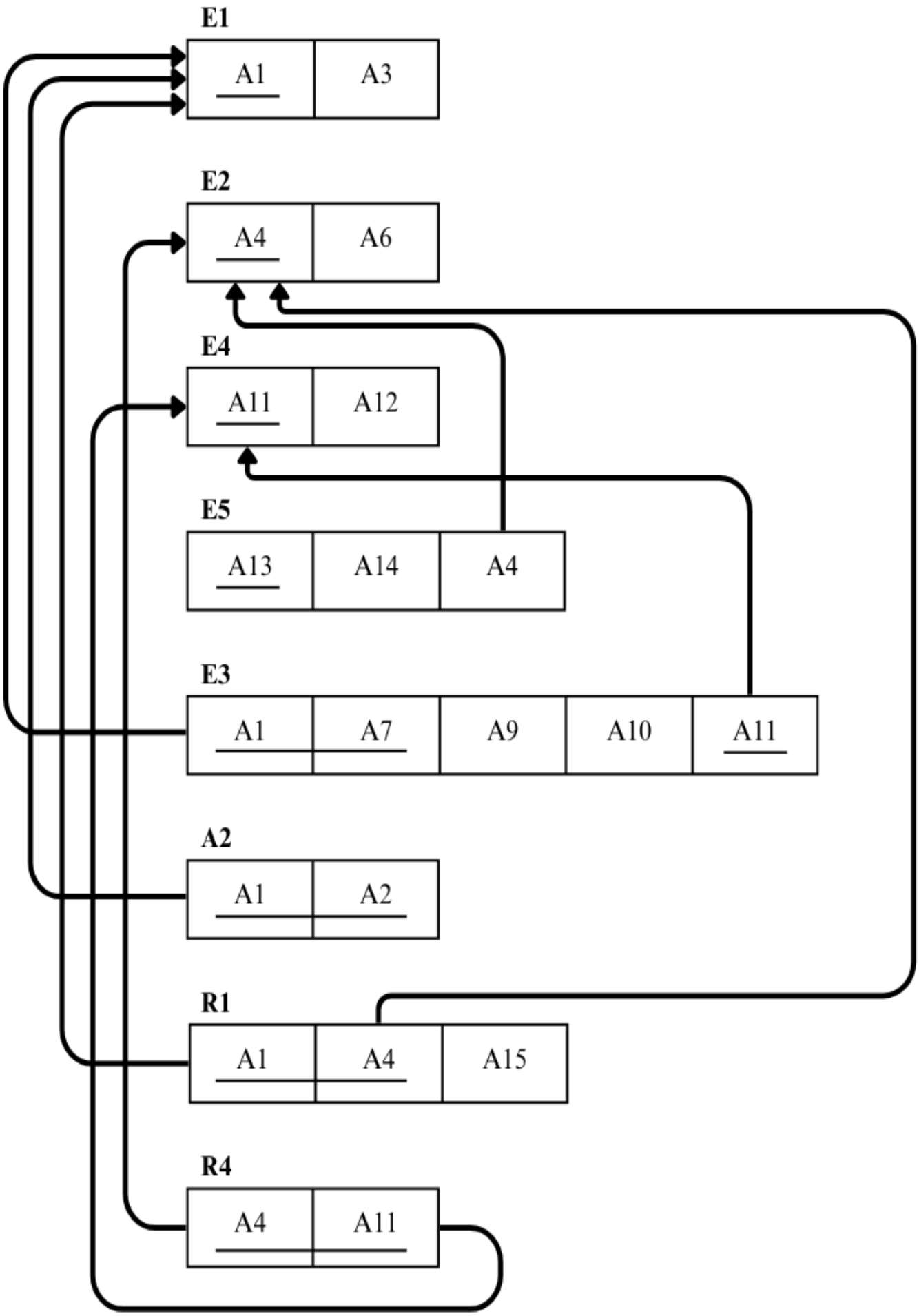
COMP9311 - Database System

Assignment 1

Question 1:



Question 2:


E1
A1
A3
E2
A4
A6
E4
A11
A12
E5
A13
A14
A4
E3
A1
A7
A9
A10
A11
A2
A1
A2
R1
A1
A4
A15
R4
A4
A11

Question 3:

1.

AvgTotalSpending = $\gamma_{\text{AVG (salePrice)}}$ (Sale)

TotalSpending = $\gamma_{\text{cusID, SUM (salePrice)}}$ (Sale)

CustCarManufacturers = $\pi_{\text{cusID, manuID}}$ (Sale $\bowtie$ Car)

CustManufacturerCount = $\gamma_{\text{cusID, COUNT (DISTINCT (manuID))}}$ (CustCarManufacturers)

EligibleCust = $\sigma_{\text{COUNT (DISTINCT (manuID)} > 2)}$ (CustManufacturerCount)

HighSpenders = $\sigma_{\text{TotalSpending} > \text{AvgTotalSpending}}$ (TotalSpending × AvgTotalSpending)

FinalResult = π_{cusName} (Customer $\bowtie$ (EligibleCust $\cap$ HighSpenders)

2.

ServiceCount = $\gamma_{\text{carID, sYear, COUNT (serID)}}$ (Service)

OverServicedCars = π_{carID} ($\sigma_{\text{COUNT (serID)} > 1}$ (ServiceCount))

OverServicedManufacturers = π_{manuID} (OverServicedCars $\bowtie$ Car)

EligibleManufacturers = π_{manuID} (Manufacturer) – OverServicedManufacturers

HighRatedSaleperson = $\sigma_{\text{rating} > 4.5}$ (Salesperson)

HighRatedSales = π_{carID} (Sale $\bowtie$ HighRatedSaleperson)

HighRatedManufacturer = π_{manuID} (HighRatedSales $\bowtie$ Car)

FinalResult = π_{makName} ((EligibleManufacturers $\cap$ HighRatedManufacturer) $\bowtie$ Manufacturer)

3.

StartYear = $\gamma_{\text{salpID, MIN (saleYear)}}$ (Sale)

SalesYearCount = $\gamma_{\text{salpID, COUNT (DISTINCT (saleYear))}}$ (Sale)

TotalYears = $\pi_{\text{salpID, (2024−startYear+1)}}$ (StartYear)

ConsistentSales = π_{salpID} ($\sigma_{\text{COUNT (DISTINCT (saleYear))} = \text{(2024−startYear+1)}}$ (SalesYearCount $\bowtie$ TotalYears))

$AvgYearSale = \gamma_{saleYear,\ AVG\ (salePrice)}\ (Sale)$

$AboveAvgSales = \pi_{salpID}\ (\sigma_{salePrice \geq avgPrice}\ (Sale \bowtie AvgYearSale))$

FinalResult $= \pi_{salpName}\ ((ConsistentSales \cap AboveAvgSales) \bowtie Salesperson)$

4.

$ServiceCount = \gamma_{carID,\ COUNT\ (DISTINCT\ (sYear))}\ (Service)$

$SingleServiceCars = \pi_{carID}\ (\sigma_{COUNT\ (DISTINCT\ (sYear)) = 1}\ (ServiceCount))$

$SaleService = \pi_{carID,\ saleYear,\ sYear}\ (Sale \bowtie_{carID\ =\ carID} Service)$

$ThreeYearCars = \pi_{carID}\ (\sigma_{sYear \geq saleYear + 3}\ (SaleService))$

FinalResult $= SingleServiceCars \cap ThreeYearCars$