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Homework #2

Problem 1.

1.

$$\pi_{Card}(Issuer \bowtie \pi_{Bank}(\sigma_{Location='Boston'}(BankLocation)))$$

2.

$$\pi_{Card}(Issuer \bowtie (\pi_{Bank}(\sigma_{Location\neq'NY'}(BankLocation))))$$

3.

$$\pi_{Bank}(Issuer \bowtie (\pi_{Card}(\sigma_{MaxLimit<100{,}000}(MaxLimits))))$$

4.

$$\rho(A, Issuer)$$

$$\rho(B, Issuer)$$

$$\pi_{Bank}(Issuer) - \pi_{Bank}(A \bowtie_{A.Bank=B.Bank \wedge A.Card=B.Card} (B))$$

5.

$$(\pi_{Bank}(\sigma_{Card='MasterCard'}(Issues))) \cap (\pi_{Bank}(\sigma_{Card='Visa'}(Issues)))$$

6.

$$Issuer/(\pi_{Card}(MaxLimits))$$

Problem 2.

1.

$$\pi_{Cname='Macy\ Downtown\ SLC'}(Visits)$$

2.

$$(\pi_{Sname}(\sigma_{Pname='Iphone8'}(Serves))) \cap (\pi_{Sname}(\sigma_{Pname='Galaxy10'}(Serves)))$$

3.

$$\pi_{Sname}(Serves \bowtie (\pi_{Pname}(\sigma_{Cname='John'}(Likes))))$$

4.

$$\pi_{Sname,Pname}(Serves - (Likes \bowtie (Serves \bowtie (\pi_{Sname}(Visits)))))$$

5.

$$\rho(A, \pi_{Sname,Cname}(Likes \bowtie Serves))$$

$$\pi_{Cname}(A \bowtie_{A.Sname=Visits.Sname \wedge A.Cname=Visits.Cname} (Visits))$$

6.

$$\rho(A, (\pi_{Sname,Cname}(Likes \bowtie Serves)) - (\pi_{Sname,Cname}(Visits))$$

$$\pi_{Cname}(A \bowtie_{A.Cname \neq Serves.Cname} (Serves))$$

7.

$$\rho(A, \pi_{Cname}\left(\frac{Visits}{\pi_{Sname}(\sigma_{Sname='Alice'}(Visits))}\right))$$

$$\sigma_{Cname \neq 'Alice'}(A)$$

8.

$$\rho(A, \pi_{Cname}(\frac{Visit}{\pi_{Sname}(\sigma_{Cname='Alice'}(Visits))})$$

$$\rho(B, \sigma_{Cname \neq 'Alice'}(A))$$

$$\rho(C, B \bowtie_{B.Cname=Visits.Cname \wedge B.Sname \neq Visits.Sname} (Visits))$$

$$\rho(B) - \rho(C)$$

9.

$$\rho(S1, Serves)$$

$$\rho(S2, Serves)$$

$$\rho(S3, \pi_{S1.Sname,S2.Pname,S1.Price}(S1 \bowtie_{S1.Pname=S2.Pname \wedge S1.Price>S2.Price} (S2))$$

$$\pi_{Sname}(Serves - S3)$$

10.

$$\rho(A, \pi_{Cname,Sname}(Visits))$$

$$\pi_{Sname}(A \bowtie_{A.Cname=Customer.Cname \wedge Customer.adress='SLC'} (Customer))$$

Problem 3.

primary keys:

Athlete: loginId or aId
Club: clubId or clubTitle

superkeys:
Athlete: (rating, aId, clubId) or (rating, loginId, clubId)
Club: (clubTitle, clubId)

candidate keys:
Athlete: (loginId, aId)
Club: (clubTitle, clubId)

Problem 4.

1.

A	Q	R	A	B	C
20	a	5	20	b	6
20	a	5	20	b	5

2.

A	Q	R	A	B	C
25	b	8	20	b	6
25	b	8	20	b	5

3.

A	Q	R	B	C
20	a	5	b	6
20	a	5	b	5

4.

A	Q	R	A	B	C
20	a	5	20	b	5