Q1.

A)

$$\pi_{age}(\sigma_{zipcode=02125}Customers)$$

B)

$$\pi_{manufacturer}((\pi_{vin}(\sigma_{price>30{,}000}Sales)) \bowtie Vehicles)$$

C)

$$\pi_{age}(\pi_{cid}(\pi_{vin}(\sigma_{manufacturer='Honda'}Vehicles) \bowtie Sales) \bowtie Customers)$$

D)

$$\pi_{zipcode}\left(\pi_{cid}\left(\pi_{cid,vin}\left(\sigma_{price\leq 20{,}000}\ Sales\right) \bowtie \sigma_{manufacturer='Honda' \wedge seats\geq 6'}Vehicles\right) \bowtie Customers\right)$$

E)

$$\pi_{zipcode}(\pi_{cid}(\pi_{vin}(\sigma_{seats=2}\ Vehicles) \bowtie Sales) \bowtie Customers)$$

$$\cup$$

$$\pi_{zipcode}(\pi_{cid}(\sigma_{price\geq 50{,}000}\ Sales) \bowtie Customers)$$

F)

$$\pi_{age}(\left(\pi_{cid}(Sales) - \pi_{cid}\left(\sigma_{manufacturer<>'Ford'}Vehicles \bowtie Sales\right)\right) \bowtie Customers)$$

G)

$$\pi_{manufacturer}\left(\sigma_{zipcode=02125}\ Customers \bowtie Sales \bowtie Vehicles\right) - \pi_{manufacturer}\left(\sigma_{age>40}Customers \bowtie Sales \bowtie Vehicles\right)$$

H)

$$\rho(TMP1, Sales)$$

$$\rho(TMP2, Sales)$$

$$\rho(TMP3, \pi_{vin}Sales - \pi_{TMP1.vin}(TMP1 \bowtie_{TMP1.price<TMP2.price} TMP2))$$

$$\pi_{manufacturer,year}(TMP3 \bowtie Vehicles)$$

I)

$$\rho(C1, Customers)$$

$$\rho(C2, Customers)$$

$$\rho(C3, \pi_{cid} Customers - \pi_{C1.cid}(C1 \bowtie_{C1.age>C2.age} C2))$$

$$\rho(SalesYoungest, C3 \bowtie Sales)$$

$$\rho(S1, SalesYoungest)$$

$$\rho(S2, SalesYoungest)$$

$$\rho(S3, \pi_{vin} SalesYoungest - \pi_{S1.vin}(S1 \bowtie_{S1.price<S2.price} S2))$$

$$\pi_{manufacturer}(S3 \bowtie Vehicles)$$

Q2.

A)

$$\pi_{sname}(\pi_{sid}(\sigma_{grade=10}Enrolled) \bowtie Students)$$

B)

$$\pi_{age}(\pi_{sid}(\pi_{cid}(\sigma_{credits=3}Courses) \bowtie Enrolled) \bowtie Students)$$

C)

$$\pi_{sname}(\pi_{sid}(\pi_{cid}(\sigma_{cname='Calculus'}Courses) \bowtie Enrolled) \bowtie Students)$$

D)

$$\pi_{sname}(\pi_{sid}(\pi_{cid}(\sigma_{credits<4}Courses) \bowtie \sigma_{grade\geq 8}Enrolled) \bowtie Students)$$

E)

$$\pi_{sname}(\left(\pi_{sid}(Enrolled) - \pi_{sid}(\sigma_{grade<>10}Enrolled)\right) \bowtie Students)$$

F)

$$\pi_{sname}\left((\pi_{sid}(\pi_{cid}(\sigma_{credits=3}Courses) \bowtie Enrolled) \cup \pi_{sid}(\sigma_{grade=10}Enrolled)) \bowtie Students\right)$$

G)

$$\pi_{age}\left(\left(\pi_{sid}(Enrolled \bowtie \sigma_{cname="Calculus"}Courses) - \pi_{sid}(Enrolled \bowtie \sigma_{credits=4}Courses)\right) \bowtie Students\right)$$

H)

$$\rho(Enr1, Enrolled)$$

$$\rho(Enr2, Enrolled)$$

$$\pi_{sname}(\left(\pi_{sid}(Enrolled) - \pi_{Enr1.sid}(Enr1 \bowtie_{(Enr1.sid=Enr2.sid)\wedge(Enr1.cid<>Enr2.cid)} Enr2)\right) \bowtie Students)$$

I)

$$\rho(TMP1, Courses)$$

$$\rho(TMP2, Courses)$$

$$\rho(TMP3, \pi_{cid}Courses - \pi_{TMP1.cid}(TMP1 \bowtie_{TMP1.credits<TMP2.credits} TMP2))$$

$$\pi_{grade}(TMP3 \bowtie Enrolled)$$