Homework 4

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CS 5530 Spring 2022

Part 1

1.

T1.A	Q	R	T2.A	B	C
20	a	5	20	b	6
20	a	5	20	b	5

2.

T1.A	Q	R	T2.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.

T1.A	Q	R	T2.A	B	C
20	a	5	20	b	5

Part 2

1. $\sigma_{T2.x==T3.x\&\&T2.y==T3.y}(T2 \times T3)$

2. $\pi_x(T2) - (\pi_x(T2) - T1)$

3. $\pi_z(\sigma_{T3.y==T2.y}(T2 \times T3))$

4. $\pi_x(T2) - \pi_x((\pi_x(T2) \times T1) - T2)$

Part 3

1. $\pi_{Name}(\sigma_{Elo>=2850}(Players))$

2. $\pi_{Name}(Players \bowtie_{pID==wpID} Games)$

3. $\pi_{Name}(\sigma_{Result=="W"}(Players \bowtie_{pID==wpID} Games))$

4. $\rho(GamesIn2018, \sigma_{Year==2018}(Events \bowtie Games))$
   $\pi_{Name}(Players \bowtie_{pID==wpID||pID==bpID} GamesIn2018)$

5. $\rho(GamesCarlsenPlayedWhite, \sigma_{Name=="Magnus\ Carlsen"}(Players) \bowtie_{pID==wpID} Games)$
   $\rho(GamesCarlsenPlayedBlack, \sigma_{Name=="Magnus\ Carlsen"}(Players) \bowtie_{pID==bpID} Games)$
   $\rho(GamesCarlsenLost,$
       $\sigma_{Result=="W"}(GamesCarlsenPlayedBlack) \cup \sigma_{Result=="B"}(GamesCarlsenPlayedWhite))$
   $\pi_{Name,\ Year}(Events \bowtie GamesCarlsenLost)$

6. $\rho(GamesCarlsenPlayedWhite, \sigma_{Name=="Magnus\ Carlsen"}(Players) \bowtie_{pID==wpID} Games)$
   $\rho(GamesCarlsenPlayedBlack, \sigma_{Name=="Magnus\ Carlsen"}(Players) \bowtie_{pID==bpID} Games)$
   $\rho(OpponentPIDs, \pi_{bpID}(GamesCarlsenPlayedWhite) \cup \pi_{wpID}(GamesCarlsenPlayedBlack))$
   $\pi_{Name}(Players \bowtie OpponentPIDs)$

7. $\rho(PIDsHaveLost, \pi_{wpID}(\sigma_{Result=="B"}(Games)) \cup \pi_{bpID}(\sigma_{Result=="W"}(Games)))$
   $\rho(PIDsNeverLost, \pi_{pID}(Players) - PIDsHaveLost))$
   $\pi_{Name}(Players \bowtie PIDsNeverLost)$

Part 4

1.

   a.

Name
Jon
Abby
Steve
Maria

   b. Names of students who have not earned a C from any course they're enrolled in.

2.

   a.

Name

   b. Names of students who share Maria's DOB.

3.

   a.

cName

   b. Names of courses that enroll all students.

4. $\rho(\text{3xxxLevelCIDs}, \pi_{cID}(\sigma_{cID>=3000\&\&CID<4000}(\text{Courses})))$
   $\pi_{Name}(\pi_{sID, cID}(\text{Students} \bowtie \text{Enroll}) / \text{3xxxLevelCIDs})$

5. $\rho(\text{Steve}, \pi_{sID, Name}(\sigma_{Name=="Steve"}(\text{Students})))$
   $\rho(\text{StevesCIDs}, \pi_{cID}(\text{Steve} \bowtie \text{Enroll}))$
   $\rho(\text{StevesBFFs}, \pi_{sID, Name, cID}(\text{Students} \bowtie \text{Enroll}) / \text{StevesCIDs})$
   $\pi_{Name}(\text{StevesBFFs} - \text{Steve})$