

Homework 4

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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. $\pi_{\text{Name}}(\sigma_{\text{Elo} \geq 2850}(\text{Players}))$
2. $\pi_{\text{Name}}(\text{Players} \bowtie_{\text{pID}=\text{wpID}} \text{Games})$
3. $\pi_{\text{Name}}(\sigma_{\text{Result}="W"}(\text{Players} \bowtie_{\text{pID}=\text{wpID}} \text{Games}))$
4. $\rho(\text{GamesIn2018}, \sigma_{\text{Year}=2018}(\text{Events} \bowtie \text{Games}))$
 $\pi_{\text{Events.Name}}(\text{Players} \bowtie_{\text{pID}=\text{wpID}} \mid \mid \text{pID}=\text{bpID}} \text{GamesIn2018})$
5. $\rho(\text{GamesCarlsenPlayedWhite}, \sigma_{\text{Name}="Magnus Carlsen"}(\text{Players}) \bowtie_{\text{pID}=\text{wpID}} \text{Games})$
 $\rho(\text{GamesCarlsenPlayedBlack}, \sigma_{\text{Name}="Magnus Carlsen"}(\text{Players}) \bowtie_{\text{pID}=\text{bpID}} \text{Games})$
 $\rho(\text{GamesCarlsenLost},$
 $\quad \sigma_{\text{Result}="W"}(\text{GamesCarlsenPlayedBlack}) \cup \sigma_{\text{Result}="B"}(\text{GamesCarlsenPlayedWhite}))$
 $\pi_{\text{Events.Name, Year}}(\text{Events} \bowtie \text{GamesCarlsenLost})$
6. $\rho(\text{BlackOpponents}_{\text{pID} / \text{bpID}}, \pi_{\text{bpID}}(\sigma_{\text{Name}="Magnus Carlsen"}(\text{Players}) \bowtie_{\text{pID}=\text{wpID}} \text{Games}))$
 $\rho(\text{WhiteOpponents}_{\text{pID} / \text{wpID}}, \pi_{\text{wpID}}(\sigma_{\text{Name}="Magnus Carlsen"}(\text{Players}) \bowtie_{\text{pID}=\text{bpID}} \text{Games}))$
 $\rho(\text{AllOpponents}, \text{BlackOpponents} \cup \text{WhiteOpponents})$
 $\pi_{\text{Name}}(\text{Players} \bowtie \text{AllOpponents})$
7. $\rho(\text{PIDsHaveLostAsWhite}_{\text{pID} / \text{wpID}}, \pi_{\text{wpID}}(\sigma_{\text{Result}="B"}(\text{Games})))$
 $\rho(\text{PIDsHaveLostAsBlack}_{\text{pID} / \text{bpID}}, \pi_{\text{bpID}}(\sigma_{\text{Result}="W"}(\text{Games})))$
 $\rho(\text{PIDsHaveLost}, \text{PIDsHaveLostAsWhite} \cup \text{PIDsHaveLostAsBlack})$
 $\rho(\text{PIDsNeverLost}, \pi_{\text{pID}}(\text{Players}) - \text{PIDsHaveLost})$
 $\pi_{\text{Name}}(\text{Players} \bowtie \text{PIDsNeverLost})$

Part 4

1.

a.

Name
Jon
Abby

b. Names of students who are enrolled in at least one course and 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. $\rho(3xxxLevelCIDs, \pi_{cID}(\sigma_{cID \geq 3000 \& \& cID < 4000}(Courses)))$

$\pi_{Name}(\pi_{sID, cID}(Students \bowtie Enroll) / 3xxxLevelCIDs)$

5. $\rho(Steve, \pi_{sID}(\sigma_{Name == "Steve"}(Students)))$

$\rho(StevesCIDs, \pi_{cID}(Steve \bowtie Enroll))$

$\rho(StevesBFFs, (\pi_{sID, cID}(Enroll) / StevesCIDs) - Steve)$

$\pi_{Name}(Students \bowtie StevesBFFs)$