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CS 143 HW #1 – Relational Algebra

1. R(A, B, C)

A	B	C
7	5	3
2	1	2
1	4	3
5	8	7
6	7	9

S(A, B, C)

A	B	C
2	1	2
1	4	4
8	3	2
5	8	7

(R - S) U (S - R)

A	B	C
7	5	3
1	4	3
6	7	9
1	4	4
8	3	2

ANSWER

(R - S) U (S - R)		
A	B	C
7	5	3
1	4	3
6	7	9
1	4	4
8	3	2

2. $\sigma_{(R.L > S.M) \wedge (R.M < S.P)} (R \times S)$

(R×S) R.L	R.M	S.M	S.N	S.P	
4	3	6	1	8	x
4	3	1	6	4	√
4	3	2	5	1	x
4	3	3	4	7	√
6	5	6	1	8	x
6	5	1	6	4	x
6	5	2	5	1	x
6	5	3	4	7	√
8	7	6	1	8	√
8	7	1	6	4	x
8	7	2	5	1	x
8	7	3	4	7	x

ANSWER

R.L	R.M	S.M	S.N	S.P
4	3	1	6	4
4	3	3	4	7
6	5	3	4	7
8	7	6	1	8

$\sigma \pi \times \bowtie \rho \cup - \cap$

cross with itself
rename

3.

Student		Course		Enrollment	
Student Name (SName)	Dept.	Course Name (CName)	Dept	Student Name	Course Name

a) $\pi_{SName}(Student) - \pi_{SName}(\sigma_{CNAME='DMS'}(Enrollment))$

b) $\pi_{SName}(\sigma_Z(Student \bowtie Enrollment) \times Course)$

$Z = Course.dept \neq student.dept \wedge enrollment.CName = Carse\ cName$

c) $\pi_{CName}(Course) - \pi_{CName}(Enrollment)$

d) $\pi_{dept}(Student \bowtie (\pi_{SName}(\sigma_{dept='CS'}(Enrollment \bowtie Course))))$

- Enrollment $\bowtie$ Carse : SNAME CNAME Dept
- select department = CS (classes given by CS dept)
- Get students names → that are in CS class
- Join with students : SNAME Dept
- Return dept ✓

e) $\pi_{dept}(Student \bowtie (\pi_{SName}(Student) - \pi_{E_1.SName}(\sigma_Y(Z))))$

$Z = (\rho_{E_1}(Enrollment) \times \rho_{E_2}(Enrollment))$

$Y = (E_1.SName = E_2.SName \wedge E_1.CName \neq E_2.cname)$

A5	A5	• Rename "Enrollment" to E_1, E_2 and cross with itself
A5	B3 ✓	• Select rows where the same name appears twice
A5	C6	in the row and the courses are different
B3	A5	• represents students taking 2+ courses
B3	B3	• Get the names of students from previous step
B3	C6	• Subtract these names from list of all student names
C6	A5 ✓	• represents students NOT taking 2+ courses (enrolled max at most one)
C6	B3 ✓	• Natural Join these names with "Student" so
C6	C6	we can see their departaments
		• Return dept ✓

4. $\pi_{company.Name}(Company) - \pi_{C_1.cname}(\sigma_{C_1.valuation > C_2.valuation}(\rho_{C_1}(company) \times \rho_{C_2}(company)))$

- rename, cross company with itself to compare
- check which companies on left have higher valuation than right
- get the name of those company(s)
- subtract them from list of all companies
- left with lowest rated company