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CS 143 HW 1

1) Suppose relation R(A,B,C) has the tuples:

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

and relation S(A,B,C) has the tuples:

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

Compute (R-S) U (S - R). List all the tuples in the result relation:

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

2) Suppose relation R(L,M) has the tuples:

L	M
4	3
6	5
8	7

and relation S(M,N,P) has the tuples:

M	N	P
6	1	8
1	6	4
2	5	1
3	4	7

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

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

3) Assume the following database for this problem. The relations represent information on course enrollment in a university:

Student(Student-name, Department)
Course(Course-name, Department)
Enrollment(Student-name, Course-name)

Assumptions:

- Student names and course names are unique
- A student can enroll in multiple courses
- A student can enroll in a course offered by any department

Write a relational-algebra expression for each of the following queries. Use only the operators we learnt in class.

a) $\pi_{Student-name}(Student) - \pi_{Student-name}(\sigma_{Course-name = 'Database\ Management\ Systems'}(Enrollment))$

b)$\pi_{student-name}(\sigma_{S.Department <> Course.Department \wedge S.Course-Name = Course.Course-Name}(\rho_S(Student \bowtie Enrollment) \times Course)$

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

d)$\pi_{Department}(\pi_{Student-name}(\ (\pi_{Student-name,Course-name}(Student \bowtie Enrollment)) \bowtie (\sigma_{Department='CS'}Course)\ ) \bowtie Student)$

e)$\pi_{Department}(\ (\pi_{Student-name}(Student \bowtie Enrollment)) \bowtie Student)$

4) The relation Company(company-name, valuation) captures Company-valuation information, where company-name is the name of a company and valuation is its valuation. Write a relational algebra expression to find the name of the lowest valued companies.

$\pi_{company-name}(Company - \sigma_{Company.company-name > S.company-name \wedge Company.valuation > S.valuation}(Comapny \times \rho_S Company))$