CS143: Database Systems
Homework #1 SOLUTION

1. $(R - S) \cup (S - R)$ is:

A	B	C
1	2	6
2	5	4
4	5	6

2. $R \bowtie_{R.A<S.C \wedge R.B<S.D} S$ is:

A	R.B	S.B	C	D
1	2	2	4	6
3	4	2	4	6
1	2	8	6	8
3	4	8	6	8
5	6	8	6	8
1	2	7	5	9
3	4	7	5	9

3. (a)

$$\pi_{customer-name}(\sigma_{branch-name='Region12'}(Account))$$

(b)

$$\pi_{customer-name}(\sigma_{A.city<>B.city \wedge A.branch-name=B.branch-name}(\rho_B(Branch) \times \rho_A(Customer \bowtie Account)))$$

(c)

$$\pi_{branch-name}(Branch) - \pi_{branch-name}(Account)$$

(d)

$$\pi_{customer-name}(Customer) - \pi_{customer-name}(\sigma_{branch-name='Region12'}(Account))$$

(e)

$$\pi_{customer-name}(Customer) - \pi_{customer-name}(\pi_{customer-name}(Customer) \times \pi_{branch-name}(\sigma_{city='LosAngeles'}(Branch)) - \pi_{customer-name,branch-name}(Account))$$

(f)

$$\pi_{customer-name}(Customer) - \pi_{A.customer-name}(\sigma_{A.branch-name<>B.branch-name \vee A.account-number<>B.account-number) \wedge A.customer-name=B.customer-name}(\rho_A(Account) \times \rho_B(Account)))$$

4. $\pi_{sid}(Student) - \pi_{A.sid}(\sigma_{A.GPA>B.GPA \wedge A.sid<>B.sid}(\rho_A(Student) \times \rho_B(Student)))$