

- 1 - Suppose relations R(A,C) and S(B,C,D) have the following tuples:

A	C
5	2
6	4
8	2
3	2
7	8

B	C	D
5	1	6
1	5	8
4	3	9

A	B	C	D
3	1	5	2

Compute the natural join of R and S (i.e. $R \bowtie S$) and show the resultant table. [1]

- 2 - Write a relational algebra expression using cross product to obtain the same result (Same number of columns and rows) as in Q1 [1]

$$\pi_{(a,b,c,d)} (\sigma_{R.C = S.C} (R \times S))$$

- 3 - Suppose relations R(A, B, C) has the following tuples:

A	B	C
3	2	3
4	2	4
4	5	6
3	5	3
1	2	6

A	C
3	3
4	4
3	3

Compute the projection $\pi_{A,C} (\sigma_{A=B} (R))$. [1]

- 4 - Write a query to rename the table name (R to X) and its attribute to x, y, z. (using the same relation as in Q3) [1]

$$P(x,y,z)(X)$$

- 5 - Suppose relations R(A,B) and S(B,C,D) have the following tuples:

A	B
1	2
3	4
5	6

B	C	D
2	4	6
4	6	8
4	7	9

Compute $R \bowtie_{R.A < S.C} S$ with the condition $R.A < S.C$ AND $R.B < S.D$. [1]

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

- 6 - Write a relational algebra expression using cross product to obtain the same result (Same number of columns and rows) as in Q5 [1]

$$(\sigma_{R.A < S.C \wedge R.B < S.D} (R \times S))$$