

Tutorial 4

RA Exercises

Acknowledgement: These questions are from Stanford Open Course **Introduction to Databases**

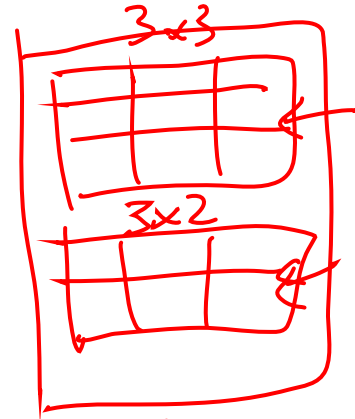
Suppose relation R(A,B,C) has the following tuples:

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

2	5	3
2	5	4
4	5	6

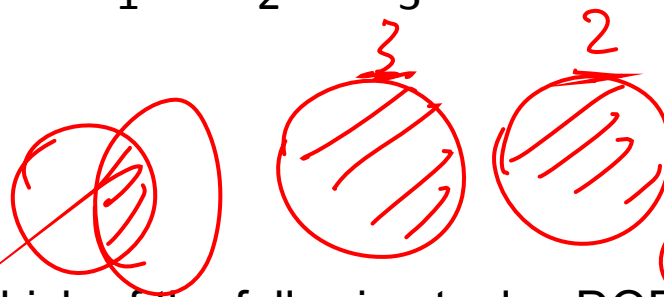
and relation S(A,B,C) has the following tuples:

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



(3×5)

set



Compute the union of R and S. Which of the following tuples DOES NOT appear in the result?

1. (4,5,6) ✓
2. (1,5,4) ?
3. (1,2,6) ✓
4. (2,5,4) ✓

R U S

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

A	C
3	3
6	4
2	3
3	5
7	1

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

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

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

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

Compute the natural join of R and S. Which of the following tuples is in the result? Assume each tuple has schema (A,B,C,D).

1. (6, 4, 3, 9)
2. (3, 3, 5, 8)
3. (7, 1, 5, 8)
4. (3, 1, 5, 8) ✓

To compute the natural join, we must find tuples from R and S that agree on all common attributes. In this case, C is the only attribute appearing in both schemas, and the tuples in the join result have attributes A, B, C, and D -- the union of the attributes from R and S.

$\pi_{A,B,C,D}(R \bowtie S)$

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

A	B
1	2
3	4
5	6

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

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

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

(2,7)

Theta join

equi-join non-equij-join

Natural Join

$A < C$
 $B < D$

Compute the theta-join of R and S with the condition $R.A < S.C$ AND $R.B < S.D$. Which of the following tuples is in the result? Assume each tuple has schema (A, R.B, S.B, C, D).

- 1.(3,4,4,6,8)
- 2.(3,4,4,7,8)
- 3.(3,4,5,7,9)
- 4.(1,2,2,6,8)

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

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

R-S
S-R

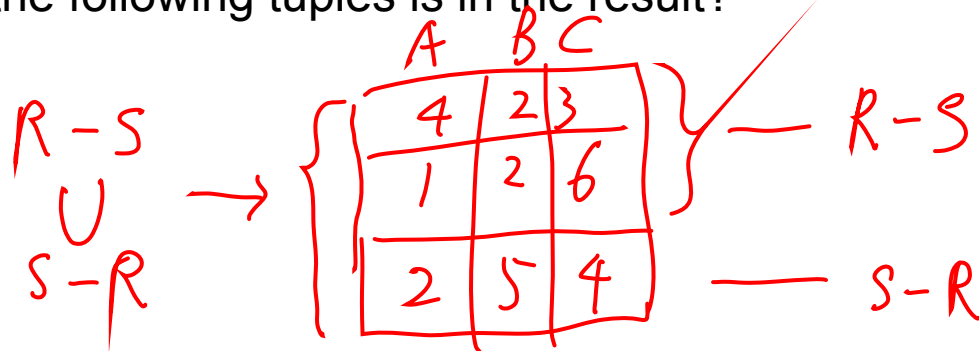
and relation S(A,B,C) has the following tuples:

S

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

Compute (R - S) union (S - R), often called the "symmetric difference" of R and S. Which of the following tuples is in the result?

1. (4,5,3)
2. (2,5,3)
3. (4,5,6)
4. (2,5,4)



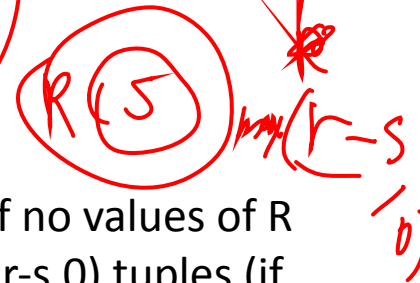
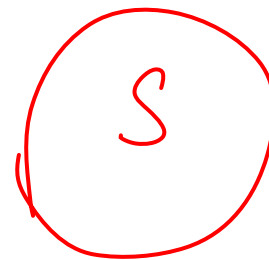
$$R \rightarrow r$$

$$S \rightarrow s$$

$$\underline{R - S} \rightarrow t$$

- Consider a relation $R(A)$ with r tuples, all unique within R , and a relation $S(A)$ with s tuples, all unique within S . Let t represent the number of tuples in R minus S . Which of the following triples of values (r,s,t) is possible?

1. $(10,5,2)$
2. $(5,3,1)$
3. $(5,0,3)$
4. $(5,3,4)$



R minus S has at most r tuples (if no values of R are also in S) and as few as $\max(r-s, 0)$ tuples (if all values of R are also in S).

$$r - s \leq t \leq r$$