



Gradiance Online Accelerated Learning

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You obtained a score of 75.0 points, out of a possible 105.0 points.
You have answered 5 questions correctly.
You have answered 2 questions incorrectly.
For each correct answer, you received 15.0 points
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Number of questions: 7
Positive points per question: 15.0
Negative points per question: 0.0
Your score: 75

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

A	B	C	D
2	2	3	3
3	2	4	4
3	3	5	2
3	3	2	5
4	4	3	3
4	4	4	4
5	3	5	2
3	2	2	5
5	2	3	3
5	2	4	4

Using bag projection and difference, compute

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

Note that the remaining is only to give the two projections the same schema.

Which of the following is true about the tuples that appear in the result?

- (3, 2) appears once in the result.
- (3, 3) does not appear in the result.
- (5, 2) appears twice in the result.
- (4, 4) appears -1 times in the result.

Answer submitted: **b)**

You have answered the question correctly.

2. Suppose relation R1(L, M) has the tuples:

R1

L	M
7	f
3	d
4	e
6	d
1	a
9	b
3	j

and suppose relation R2(M, N) has the tuples:

R2

M	N
c	3
d	2
b	6
i	5
e	3

Identify which of the following (L, M, N) tuples can result from the left natural outer-join of R1 and R2.

- a) (4, e, null)
- b) (null, null, null)
- c) (3, j, null)
- d) (7, f, 2)

Answer submitted: **a)**

Your answer is incorrect.

3. Here are three relations, R1(m, n), R2(m, n), and R3(m, n). Their current values are:

R1

m	n
a	a
a	b
b	a
b	b

R2

m	n
---	---

m	n
a	a
a	b
b	a
b	b

R3

m	n
a	a
a	b
b	a
b	b

Compute the result of the following query:

SELECT R1.m, R1.n, R2.n, R3.n FROM R1, R2, R3 WHERE R1.n = R2.m AND R2.n \bowtie R3.n AND R3.m \bowtie b;

Identify in the list below the true statement about whether or not a tuple appears in the output and how many times it appears in the output.

- a) (a, a, b, b) appears once.
- b) (b, b, b, a) appears twice.
- c) (a, a, a, a) does not appear.
- d) (a, a, a, b) appears twice.

Answer submitted: **c)**

You have answered the question correctly.

4. Suppose relation R(X, Y, Z) has the tuples:

X	Y	Z
2	6	5
5	6	1
9	0	1
9	0	7
5	6	5

Compute the bag union of the following four expressions, each of which is the bag projection (PI) of a grouping (GAMMA) operation using renaming (RHO):

1. $\text{PI}_A(\text{RHO}_R\{X, Y, A\}(\text{GAMMA}_{\{X, Y, \text{AVG}(Z)\}}(R)))$
2. $\text{PI}_A(\text{RHO}_R\{Y, A\}(\text{GAMMA}_{\{Y, \text{SUM}(Z)\}}(R)))$
3. $\text{PI}_A(\text{RHO}_R\{X, A\}(\text{GAMMA}_{\{X, \text{MIN}(Z)\}}(R)))$
4. $\text{PI}_A(\text{RHO}_R\{Y, A\}(\text{GAMMA}_{\{Y, \text{MAX}(X)\}}(R)))$

Demonstrate that you have computed this bag correctly by identifying, from the list below, the correct count of occurrences for one of the elements.

- a) 8 appears exactly three times.
- b) 10 appears exactly once.

- c) 11 appears exactly once.
- d) 1 appears exactly three times.

Answer submitted: c)

You have answered the question correctly.

5. Suppose relation R(L, M, N) has the tuples:

L	M	N
1	1	2
2	1	1
2	3	2
1	1	1
3	2	1
1	1	3

Using bag projection and intersection, compute $\Pi_{(L,M)}(R) \cap_{Q_{S(L,M)}}(\Pi_{(M,N)}(R))$. Note that the renaming is only to give the two projections the same schema. Which of the following is true about the tuples that appear in the result?

- a) (1, 1) appears twice in the result.
- b) (3, 2) does not appear in the result.
- c) (3, 2) appears twice in the result.
- d) (1, 1) appears five times in the result.

Answer submitted: a)

You have answered the question correctly.

6. Consider the relational database shown below:

student(studentname, street, city)

study(studentname, universityname, SAT)

university(universityname, city)

tutor(tutorname, personname)

Identify the correct relational algebra expression for the queries shown below.

Assume the following notations:

Π - Projection

\Join - Natural Join

σ - Selection

\times - Products

- a) Find the names of all students whose SAT score is greater than the SAT score for every student of NC State University. $\Pi_{\text{studentname}}(\text{study}) - (\sigma_{\text{study.studentname} \Join \text{study.SAT} \leq \text{study2.SAT and study2.universityname} = \text{"NC State University"}} \Join \text{study2}(\text{study}))$

- b) Find the names and cities of residence of all students who study at NC State University. $\Pi_{\text{studentname}, \text{city}}(\text{student} \bowtie (\sigma_{\text{universityname} = \text{"NC State University"}}(\text{study})))$
- c) Find the names of all students in this database who live in the same city as the university for which they study. $\Pi_{\text{studentname}}(\text{student} \times (\text{study} \bowtie \text{university}))$
- d) Find the names and cities of residence of all students who study at NC State University. $\Pi_{\text{studentname}, \text{city}}(\text{student} \bowtie (\sigma_{\text{universityname} = \text{"NC State University"}}(\text{university})))$

Answer submitted: **d)**

Your answer is incorrect.

7. Suppose relation R(a, b, c, d, e) currently has the tuples: R

a	b	c	d	e
1	4	3	7	3
2	1	4	3	3
5	3	1	2	2
3	8	5	1	7

Which of the following tuples is in the generalized projection $\text{PROJ}_{\{b, d - a, 3 * e\}}(R)$?

- a) (4, 6, 9)
- b) (3, 3, 4)
- c) (1, 2, 3)
- d) (4, 2, 9)

Answer submitted: **a)**

You have answered the question correctly.