

## **Gradiance Online Accelerated Learning**

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7 **Number of questions:** 15.0 Positive points per question: **Negative points per question:** 0.0 Your score: 90

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

A	В	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

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

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?

- a) (3,3) does not appear in the result.
- b) (5, 2) appears once in the result.
- c) (5, 2) appears twice in the result.
- d) (3, 2) appears once in the result.

Answer submitted: a)

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

Answer submitted: a)

You have answered the question correctly.

3. 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 PROJ\_{b, d}-

- a, 3 \* e (R)?
- a) (3, -3,6)
- b) (1, 2, 3)
- c) (3,3,4)
- d) (2, 1, 4, 3, 3)

Answer submitted: a)

You have answered the question correctly.

**4.** 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
- ∞ Natural Join
- σ Selection

## × - Products

- a) Find the names of all students in this database who live in the same city as the university for which they study.  $\sigma_{\text{studentname}}$  (student  $\infty$  (study  $\times$ university))
- b) Find the names and cities of residence of all employees who work for First Bank Corporation.  $\Pi_{studentname, city}(student \times (\sigma_{universityname="NC State})$ University" (study)))
- c) Find the names of all students whose SAT score is greater than the SAT score of every student of NC State University.  $\Pi_{\text{studentname}}(\text{ study})$  - $(\Pi_{study.studentname}(study \circ study.SAT \le study2.SAT and study2.universityname =$ "NC State University" Qstudy2(study)))
- d) Find the names and cities of residence of all students who study at NC State University.  $\Pi_{studentname, city}$  (student  $\infty$  ( $\sigma_{universityname = "NC State}$ University" (university)))

Answer submitted: **d**)

Your answer is incorrect.

**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  $\Pi_{(L,M)}(R) \cap \varrho_{S(L,M)}(\Pi_{(M,N)})$ (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?

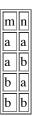
- a) (3, 2) appears twice in the result.
- b) (1, 1) appears five times in the result.
- c) (3, 2) appears once in the result.
- d) (1, 2) appears once in the result.

Answer submitted: c)

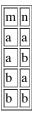
You have answered the question correctly.

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

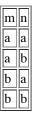
R1



R2



R3



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 $\Leftrightarrow$ R3.n AND R3.m $\Leftrightarrow$ 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) (b, b, b, a) appears twice.
- b) (a, b, a, b) appears twice.
- c) (b, b, a, a) does not appear.
- d) (a, a, b, b) appears once.

Answer submitted: c)

You have answered the question correctly.

**7.** 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):

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

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) 4 appears exactly two times.
- b) 2 appears exactly once.
- c) 11 appears exactly once.
- d) 7 appears exactly once.

Answer submitted: c)

You have answered the question correctly.