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Started on	Wednesday, November 24, 2021, 7:23 PM
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State	Finished
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Completed on	Wednesday, November 24, 2021, 8:23 PM
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Time taken	59 mins 53 secs
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Grade	73.33 out of 100.00
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Question 1

Correct

15.00 points out of 15.00

Bank Accounts

This question *may* have multiple answers, please select **all choices** that apply.

Account			
aid	name	age	balance
1	John	43	100000
2	Sarah	23	284
3	Rose	19	389
4	Michael	85	41203

Transaction		
aid	date	change
1	11-11-2021	500
1	10-04-2021	1000
2	09-07-2021	-200
2	04-07-2021	-190
3	05-04-2020	1000
3	02-03-2021	800
3	12-12-2020	200
4	03-09-2021	-40000

The relations Account and Transaction are given above. Which of the following relational algebra operations give the following output?

aid	date	balance	change
1	11-11-2021	100000	500
1	10-04-2021	100000	1000
3	02-03-2021	389	800

- ☒ A. $\pi_{aid, date, balance, change} \left((\sigma_{aid \neq 2 \wedge aid \neq 4} Account) \bowtie (\sigma_{date > 01-01-2021} Transaction) \right)$ ✓
- ☐ B. $\pi_{aid, date, balance, change} \left((\sigma_{age > 20 \wedge age < 50} Account) \bowtie (\sigma_{date > 01-01-2021} Transaction) \right)$
- ☐ C. $\pi_{aid, date, balance, change} \left(\sigma_{balance >= 500} (Account \bowtie Transaction) \right)$
- ☒ D. $\pi_{aid, date, balance, change} \left((\sigma_{change > 0 \wedge date > 01-01-2021} Transaction) \bowtie Account \right)$ ✓
- ☒ E. $\pi_{aid, date, balance, change} \left((\sigma_{age < 60 \wedge balance > 300} Account) \bowtie (\sigma_{date > 01-01-2021} Transaction) \right)$ ✓

The correct answers are:

$$\pi_{aid, date, balance, change} \left((\sigma_{aid \neq 2 \wedge aid \neq 4} Account) \bowtie (\sigma_{date > 01-01-2021} Transaction) \right)$$

$$\pi_{aid, date, balance, change} \left((\sigma_{change > 0 \wedge date > 01-01-2021} Transaction) \bowtie Account \right)$$

$$\pi_{aid, date, balance, change} \left((\sigma_{age < 60 \wedge balance > 300} Account) \bowtie (\sigma_{date > 01-01-2021} Transaction) \right)$$

Question 2

Partially correct

12.50 points out of 15.00

Fill the blanks, in the following lines. Each blank is worth 2.5 points.

The relation S contains 8 rows and the relation R contains 32 rows. The maximum number of rows in S-R can be



The relation S contains 12 rows and the relation R contains 20 rows. The maximum number of rows in their natural join can be



The relation S contains more than 0 rows and the relation R contains 32 rows. In their natural join, the minimum number of rows can be



and the maximum number of rows can be



Now, decide whether the following statements are True or False. Each answer is worth 2.5 points.

Given the relation S (a,b,c) and relation R (c,d,e). Their union is always applicable.



The relation S contains 12 rows and the relation R contains 24 rows. The intersection of R and S contains at most 12 rows.



The correct answer is:

Fill the blanks, in the following lines. Each blank is worth 2.5 points.

The relation S contains 8 rows and the relation R contains 32 rows. The maximum number of rows in S-R can be [8].

The relation S contains 12 rows and the relation R contains 20 rows. The maximum number of rows in their natural join can be [240].

The relation S contains more than 0 rows and the relation R contains 32 rows. In their natural join, the minimum number of rows can be [0] and the maximum number of rows can be [We cannot know].

Now, decide whether the following statements are True or False. Each answer is worth 2.5 points.

Given the relation S (a,b,c) and relation R (c,d,e). Their union is always applicable. [False]

The relation S contains 12 rows and the relation R contains 24 rows. The intersection of R and S contains at most 12 rows. [True]

Question 3

Correct

15.00 points out of 15.00

Best Trader

This question *may* have multiple answers, please select **all choices** that apply.

Consider the following schemata:

- $\text{Trader}(\text{trader_id}, \text{t_name}, \text{age})$
- $\text{Company}(\text{company_id}, \text{c_name}, \text{location}, \text{budget})$
- $\text{Product}(\text{product_id}, \text{company_id}, \text{price})$
- $\text{Trade}(\text{trader_id}, \text{product_id}, \text{date})$

Also the following key constraints are given:

- trader_id in Trade references Trader .
- product_id in Trade references Product .
- company_id in Product references Company .

Choose the correct relational algebra expressions that find **names** of *all* the traders who have bought *all* the products of the company, which has company name (c_name) "ODTUDEN", in the year 2021.

Assume that "ODTUDEN" is a **unique** company name for our relations.

- ☐ A.
- $\rho(\text{Temp1}, (\sigma_{\text{c_name}='ODTUDEN'} \text{Company}) \bowtie \text{Product})$
 - $\rho(\text{Temp2}, (\sigma_{\text{date} \geq 01-01-2021} \text{Trade}))$
 - $\rho(\text{Temp3}, (\text{Temp1} \bowtie \text{Temp2}))$
 - $\rho(\text{Temp4}, \text{Trader} - \text{Temp3})$
 - $\rho(\text{Result}, \pi_{\text{t_name}}(\text{Temp4} \bowtie \text{Trader}))$
- ☐ B.
- $\rho(\text{Temp1}, \sigma_{\text{date} \geq 01-01-2021} \text{Trade})$
 - $\rho(\text{Temp2}, \sigma_{\text{c_name}='ODTUDEN'} \text{Company})$
 - $\rho(\text{Temp3}, \pi_{\text{trader_id}} \text{Trader} - \pi_{\text{trader_id}} \text{Temp1})$
 - $\rho(\text{Temp4}, \text{Product} \bowtie \text{Temp2})$
 - $\rho(\text{Result}, \pi_{\text{t_name}}((\text{Temp3} / \pi_{\text{product_id}} \text{Temp4}) \bowtie \text{Trader}))$
- ☐ C.
- $\rho(\text{Temp1}, (\sigma_{\text{c_name}='ODTUDEN'} \text{Company}) \times (\pi_{\text{trader_id}, \text{t_name}} \text{Trader}))$
 - $\rho(\text{Temp2}, \pi_{\text{trader_id}, \text{product_id}}(\sigma_{\text{date} \geq 01-01-2021} \text{Trade}))$
 - $\rho(\text{Result}, \pi_{\text{t_name}}((\text{Temp2} - \text{Temp1}) \bowtie \text{Trader}))$
- ☐ D.
- $\rho(\text{Temp1}, (\sigma_{\text{c_name}='ODTUDEN'} \text{Company} \bowtie \text{Product}) \times (\pi_{\text{trader_id}, \text{t_name}} \text{Trader}))$
 - $\rho(\text{Temp2}, \pi_{\text{trader_id}, \text{product_id}}(\sigma_{\text{date} \geq 01-01-2021} \text{Trade}))$
 - $\rho(\text{Result}, \pi_{\text{t_name}}((\text{Temp2} - \text{Temp1}) \bowtie \text{Trader}))$
- ☒ E.



- $\rho(Temp1, \sigma_{date \geq 01-01-2021} Trade)$
- $\rho(Temp2, \pi_{trader_id, product_id} Temp1)$
- $\rho(Temp3, (\sigma_{c_name='ODTUDEN'} Company) \bowtie Product)$
- $\rho(Temp4, \pi_{product_id} Temp3)$
- $\rho(Result, \pi_{t_name}((Temp2/Temp4) \bowtie Trader))$

The correct answer is:

- $\rho(Temp1, \sigma_{date \geq 01-01-2021} Trade)$
- $\rho(Temp2, \pi_{trader_id, product_id} Temp1)$
- $\rho(Temp3, (\sigma_{c_name='ODTUDEN'} Company) \bowtie Product)$
- $\rho(Temp4, \pi_{product_id} Temp3)$
- $\rho(Result, \pi_{t_name}((Temp2/Temp4) \bowtie Trader))$

Question 4

Correct

12.50 points out of 12.50

Coffee Shops

Coffee		
coffeedid	coffeenname	milk
1	Latte	true
2	Espresso	false
3	Americano	false
4	Cappucino	true
5	Flat White	true

CoffeeShop		
shopid	shopname	location
100	Coffee101	100Yil
200	Arabica	100Yil
300	TetraN	100Yil
400	Grano	ODTU
500	Kocatepe	ODTU
600	A4 Coffee	100Yil

Sells		
shopid	coffeedid	price
100	1	12
100	2	10
200	1	16
200	2	12
200	3	14
200	4	16
200	5	16
300	1	14
300	2	12
300	3	13
400	1	10
400	3	10
500	1	13
500	2	12
500	4	12
500	3	12
500	5	12

You are given the above database instance for coffee shops. Also the following key constraints are given:

- coffeedid in Sells references Coffee.
- shopid in Sells references CoffeeShop.
- shopid and coffeedid are Primary key of the Sells relation.
- coffeedid is the Primary key of the Coffee relation.
- shopid is the Primary key of the CoffeeShop relation.

Now assume the following relational algebra operation:

$$\begin{aligned} & \rho(Temp1, (\pi_{shopid, coffeedid} Sells) / (\pi_{coffeedid} (\sigma_{milk=true} Coffee))) \\ & \rho(Temp2, \pi_{shopid} (\sigma_{location="100Yil"} CoffeeShop)) \\ & \rho(Temp3, Temp1 \bowtie Temp2) \\ & \rho(Temp4, \pi_{shopid} (\sigma_{price \leq 10} Sells)) \\ & \rho(Result, \pi_{shopname} ((Temp3 \cup Temp4) \bowtie CoffeeShop)) \end{aligned}$$

Which of the followings is the result of the sequence of relational algebra expressions given above?

- ☐ A.
- | |
|-----------|
| shopname |
| Coffee101 |
| Arabica |
| Grano |
| Kocatepe |
- ☒ B.
- | |
|-----------|
| shopname |
| Coffee101 |
| Arabica |
| Grano |
- ☐ C.
- | |
|--------|
| shopid |
| 100 |
| 200 |
| 400 |
| 500 |
- ☐ D.
- | |
|----------|
| shopname |
| Arabica |



E.

shopname
Coffee101
Arabica
TetraN
Grano

The correct answer is:

shopname
Coffee101
Arabica
Grano

Question 5

Partially correct

8.33 points out of 12.50

Valid Operations

This question *may* have multiple answers, please select **all choices** that apply.

Which of the expressions below are **not** valid given the following database instance:

R1		
id	name	age
1	Ali	19
2	John	32
3	Michelle	55
4	Rose	43

R2			
id	name	age	rating
4	Riza	26	5
5	Ismet	27	5
6	Osman	32	3
3	Mert	23	2

R3	
id	location
1	Ankara
2	Istanbul
3	Izmir
4	Bursa

- ☒ A. $\rho(Temp1, R1 \bowtie R3)$
 $\rho(Result, R2 \cap Temp1)$
- ☐ B. $\rho(Temp1, R1 \bowtie R3)$
 $\rho(Result, R2 \bowtie Temp1)$
- ☐ C. $\rho(Temp1, R2 \bowtie R3)$
 $\rho(Result, Temp \times R2)$
- ☐ D. $\rho(Temp1, R2 \bowtie R3)$
 $\rho(Temp2, R1 \bowtie Temp1)$
 $\rho(Result, R2 - Temp2)$
- ☒ E. $\rho(Temp1, R1 \bowtie R3)$
 $\rho(Result, R2 \cup Temp1)$



The correct answers are:

- $\rho(Temp1, R1 \bowtie R3)$
 $\rho(Result, R2 \cup Temp1)$
 $\rho(Temp1, R1 \bowtie R3)$
 $\rho(Result, R2 \cap Temp1)$

- $\rho(Temp1, R2 \bowtie R3)$
- $\rho(Temp2, R1 \bowtie Temp1)$
- $\rho(Result, R2 - Temp2)$

Question 6

Incorrect

0.00 points out of 15.00

Campus Database

This question *may* have multiple answers, please select **all choices** that apply.

Student			
sid	sname	age	gpa
1	Jack	19	2.4
2	Sarah	22	3.7
3	Rose	29	2.9
4	Ali	21	1.5
5	John	52	2.6

Course		
cid	cname	tid
111	Ceng111	103
140	Ceng140	101
334	Ceng334	104
242	Ceng242	102

Instructor	
tid	tname
101	Ismail Sengor Altingovde
102	Ahmet Oguz Akyuz
103	Gokturk Ucoluk
104	Erol Sahin

Takes			
cid	sid	semester	grade
111	1	20201	4.0
111	3	20201	3.5
140	1	20202	3.0
140	4	20201	1.5
334	2	20211	4.0
242	5	20202	2.0
242	3	20202	3.5
242	4	20202	2.5

For the database instance given above, which of the following relational algebra operations give the same output as the relational algebra operation given below:

$\pi_{sname,cname,tname,grade} \left(\left(\left(\pi_{cid} \left(\left(\sigma_{gpa \geq 2.5} Student \right) \bowtie Takes \right) \right) \bowtie \sigma_{grade \geq 3.0} Takes \right) \bowtie Instructor \bowtie Course \bowtie Student \right)$

- ☒ A. — $\rho(Temp1, Course \bowtie (\sigma_{tid \neq 101} Instructor))$
 — $\rho(Temp2, Temp1 \bowtie (\sigma_{grade \geq 3.0} Takes))$
 — $\rho(Result, \pi_{sname,cname,tname,grade}(Temp2 \bowtie Student))$
- ☐ B. — $\rho(Temp1, \sigma_{grade \leq 3.0} Takes)$
 — $\rho(Temp2, Takes - Temp1)$
 — $\rho(Temp3, Temp2 \bowtie Instructor \bowtie Course \bowtie Student)$
 — $\rho(Result, \pi_{sname,cname,tname,grade} Temp3)$
- ☒ C. — $\rho(Temp1, (\sigma_{sid \leq 3} Student) \bowtie (\sigma_{grade \geq 3.0} Takes))$
 — $\rho(Temp2, Temp1 \bowtie Course \bowtie Instructor)$
 — $\rho(Result, \pi_{sname,cname,tname,grade} Temp2)$
- ☐ D. — $\rho(Temp1, \sigma_{tid < 104} Instructor)$
 — $\rho(Temp2, \sigma_{grade \geq 3.0} Takes \bowtie Temp1)$
 — $\rho(Temp3, Temp2 \bowtie Course \bowtie Student)$
 — $\rho(Result, \pi_{sname,cname,tname,grade} Temp3)$
- ☐ E. — $\rho(Temp1, \sigma_{grade \geq 3.5} Takes)$
 — $\rho(Temp2, Temp1 \bowtie Instructor \bowtie Course \bowtie Student)$
 — $\rho(Result, \pi_{sname,cname,tname,grade} Temp2)$



The correct answers are:

- $\rho(Temp1, Course \bowtie (\sigma_{tid \neq 101} Instructor))$
- $\rho(Temp2, Temp1 \bowtie (\sigma_{grade \geq 3.0} Takes))$
- $\rho(Result, \pi_{sname, cname, tname, grade}(Temp2 \bowtie Student))$
- $\rho(Temp1, \sigma_{grade \geq 3.5} Takes)$
- $\rho(Temp2, Temp1 \bowtie Instructor \bowtie Course \bowtie Student)$
- $\rho(Result, \pi_{sname, cname, tname, grade} Temp2)$
- $\rho(Temp1, \sigma_{grade \leq 3.0} Takes)$
- $\rho(Temp2, Takes - Temp1)$
- $\rho(Temp3, Temp2 \bowtie Instructor \bowtie Course \bowtie Student)$
- $\rho(Result, \pi_{sname, cname, tname, grade} Temp3)$

Question 7

Partially correct

10.00 points out of 15.00

Company Schema

This question *may* have multiple answers, please select **all choices** that apply.

You are given the following schemata:

Employee(ssn, name, age, salary)

Department(did, dname, location)

Works_in(ssn, did, since)

Project(pid, did, projectname, deadline)

Also the following key constraints are given:

- ssn in Works_in references Employee's ssn.
- did in Works_in references Department's did.
- did in Project references Department's did.

Now, assume that each relation contains **at least one record**. Which of the following expressions **NEVER** gives the same output as the relational algebra operation below:

$\rho(Temp1, (\sigma_{age \geq 50} Employee) \bowtie Works_in)$

$\rho(Temp2, (\sigma_{deadline \geq 01-01-2022} Project) \bowtie Department)$

$\rho(Result, \pi_{ssn, name, did}(Temp1 \bowtie Temp2))$

- ☒ A. $\rho(Result, \pi_{ssn, did} Works_in)$ ✓
- ☒ B. $\rho(Temp1, (\sigma_{since \geq 2018} Works_in) \bowtie Department)$ ✗
 $\rho(Temp2, Temp1 \bowtie (\sigma_{deadline \geq 01-01-2022} Project))$
 $\rho(Temp3, Temp2 \bowtie (\sigma_{age \geq 50} Employee))$
 $\rho(Result, \pi_{ssn, name, did} Temp3)$
- ☐ C. $\rho(Result, \pi_{ssn, name, did}(Works_in \bowtie Employee))$
- ☒ D. $\rho(Result, \pi_{ssn, name} Employee)$ ✓
- ☐ E. $\rho(Result, \pi_{ssn, name, did}(Employee \bowtie Works_in \bowtie Department \bowtie Project))$

The correct answers are:

$\rho(Result, \pi_{ssn, name} Employee)$

$\rho(Result, \pi_{ssn, did} Works_in)$

◀ ICA2

Jump to...

Q & A Session at BMB4 ▶