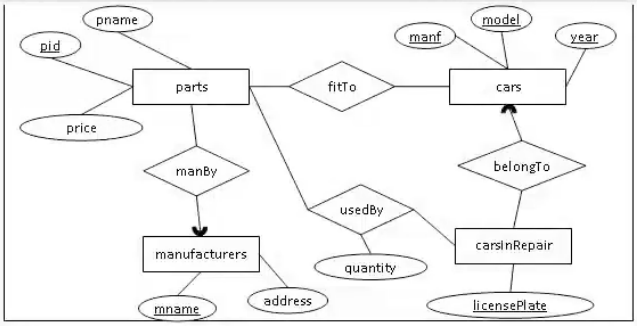
# CE 223 Midterm Exam Answers – 2022-2023

1. **True / False: Different manufacturers cannot have t...**

Question




Different manufacturers cannot have the same model.

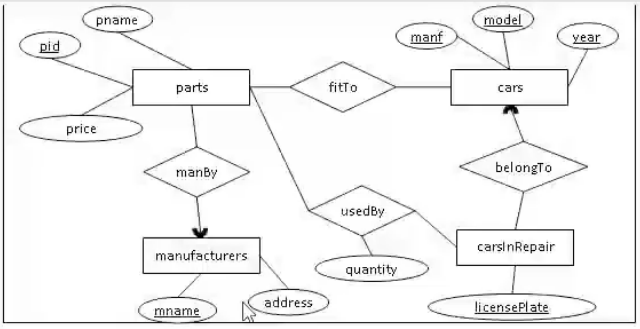
Answer

True

False

2. **True / False: A part can fit to more than one car.**

Question




A part can fit to more than one car.

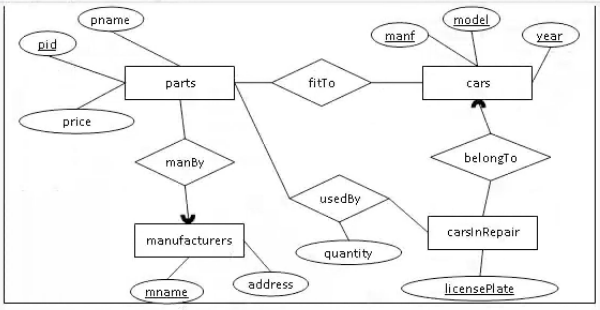
Answer

True

False

3. **True / False: Every car in the repair shop has a un...**

Question




Every car in the repair shop has a unique manufacturer, model and year.

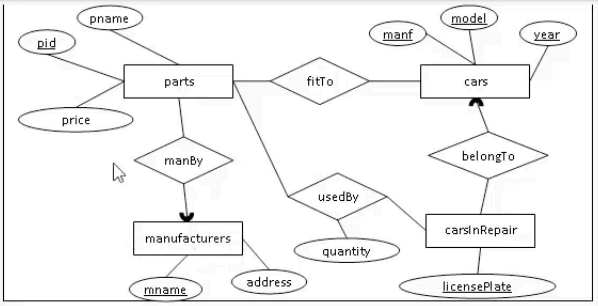
Answer

True

False

4. **True / False: A part is manufactured by exactly one...**

Question



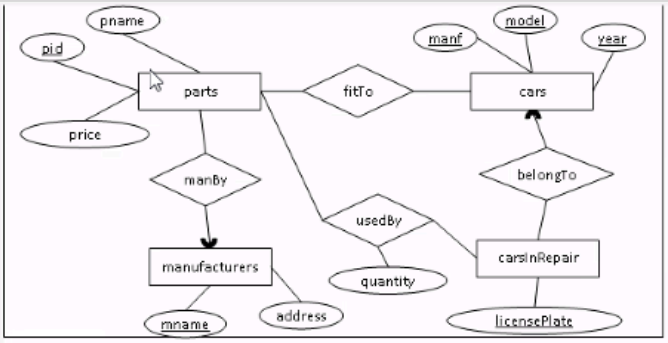

A part is manufactured by exactly one manufacturer.

Answer

- True
- False

5. **True / False: This data model cannot list all the p...**

Question



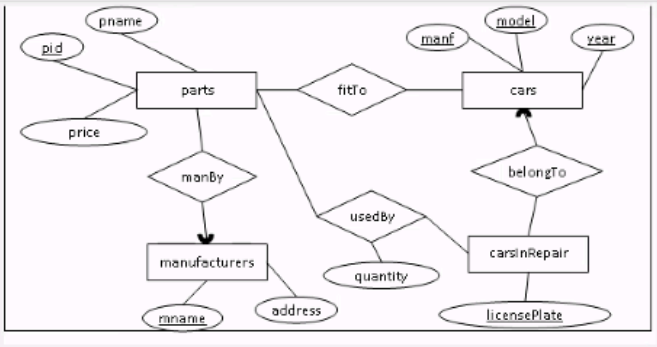

This data model cannot list all the parts used for a car under repair.

Answer

- True
- False

6. **Multiple Choice: Which of the following best explains ...**

Question




Which of the following best explains the above ER diagram?

Answer

a. This diagram contains complete information about the parts that can fit to a car under repair

b. The main concern of the diagram is to represent parts and manufacturers of parts

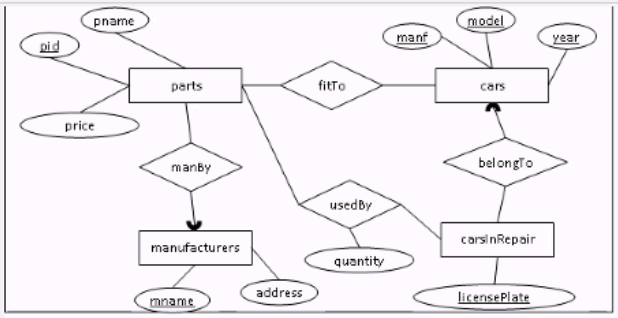
c. This is a diagram to track the overall cost of the parts used for a car in repairshop

d. All of the other three choices

e. None of the other three choices

7. **Multiple Choice: Which of the following cannot be obta...**

Question




Which of the following cannot be obtained from the database above?

Answer

a. The license plate of a car that is not in the repairshop.

b. The manufacturer of a car in repairshop

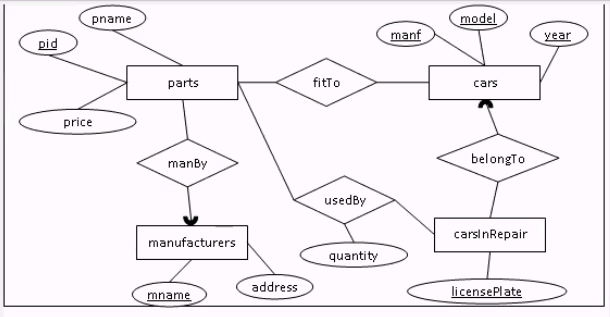
c. The names of parts used for a car in repair shop.

d. None of the other three choices.

e. All of the other three choices.

8. **Multiple Choice: Which of the following is not true fo...**

Question




Which of the following is not true for the above ER diagram?

Answer

a. Every part in stock is uniquely identified by its pid.

b. A part may fit to all models of a given manufacturer.

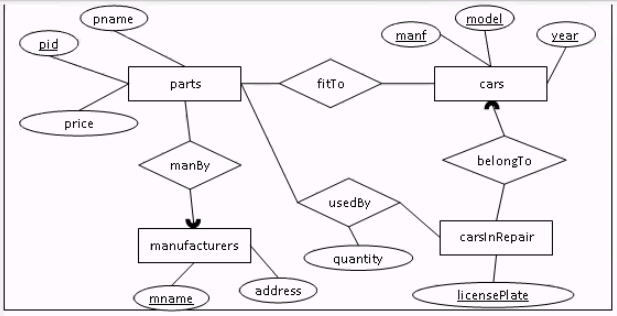
c. The quantity indicates the total number of a part in stock.

d. " Every part in stock is uniquely identified by its pid"
and
" A part may fit to all models of a given manufacturer"

e. " A part may fit to all models of a given manufacturer"
and
" The quantity indicates the total number of a part in stock"

9. **Multiple Choice: Which one of the following questions ...**

Question




Which one of the following questions cannot be answered by the above ER diagram?

Answer

a. What parts fit to a car under repair at what total cost?

b. What are the manufacturers of the parts?

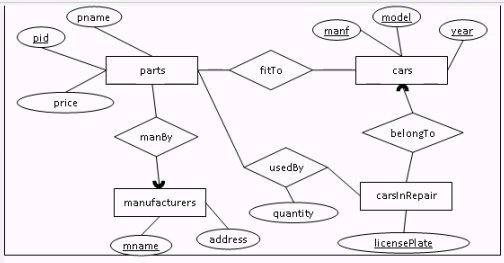
c. What are the license plates of the cars under repair?

d. What are the license plates of cars produced by a given car manufacturer?

e. None of the others.

10. **Multiple Choice: Which of the following best represent...**

Question




Which of the following best represents the tables created for entity sets cars, carsInRepair, and relationship belongTo?

Answer

a. carsInRepair(licensePlate), cars(manf. model, year), belongTo(licensePlate, manf. model, year)

b. carsInRepair(licensePlate, manf. model, year), cars(manf. model, year)

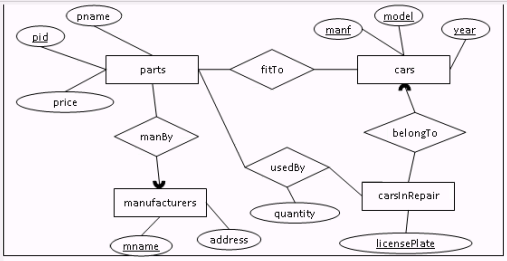
c. cars(manf. model, year), belongTo(licensePlate, manf. model, year)

d. carsInRepair(licensePlate), cars(manf. model, year)

e. carsInRepair(licensePlate), belongTo(licensePlate, manf. model, year)

11. **Multiple Choice: Which of the following best represent...**

Question




Which of the following best represents the tables created for entity sets parts, manufacturers and relationship manBy?

Answer

a. parts (pid, pname, price, mname), manufacturers (mname, address)

b. parts (pid, pname, price), manufacturers (mname, address)

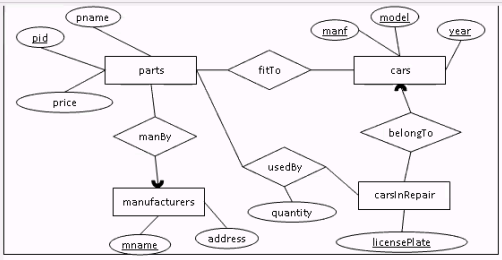
c. parts (pid, pname, price), manBy (pid, mname)

d. manufacturers (mname, address), manBy (pid, mname)

e. parts (pid, pname, price, mname, address)

12. **Multiple Choice: Which of the following best represent...**

Question




Which of the following best represents the table created for relationship usedBy?

Answer

a. usedBy (pid, licensePlate, department)

b. usedBy (pid, licensePlate, department)

c. usedBy (pid, licensePlate, department)

d. usedBy (pid, licensePlate, quantity)

e. UsedBy (pid, licensePlate, department)

13. **Multiple Choice: Given a relation R (A, B, C, D, E) wi...**

Question

Given a relation R (A, B, C, D, E) with FD's: A→B and A→C, which of the following is correct choice for keys?

Answer

a. ABC

b. ABC and ADE

c. ABE and ACE

d. ADE

e. BCE and BCD

14. **Multiple Choice: Given a relation R (A, B, C, D, E) wi...**

| | |
|---|---|
| Question | Given a relation R (A, B, C, D, E) with FD's: A→B and A→C, which of the following is correct choice for prime attributes? |
| Answer | ✓ a. A, D, and E |
| | b. A, B, and C |
| | c. B, C |
| | d. A |
| | e. None of the others |

15. **Multiple Choice: Given a relation R (A, B, C, D, E) wi...**

| | |
|---|---|
| Question | Given a relation R (A, B, C, D, E) with FD's: A→B and A→C, which of the following decompositions cannot maintain dependency preservation property? |
| Answer | a. ABC, BCD, CDE |
| | b. ABC, ADE |
| | ✓ c. ACD, ADE |
| | d. AB, AC, DE |
| | e. AE, ABCD |

16. **Multiple Choice: Given the relation schema R (A, B, C,...**

| | |
|---|---|
| Question | Given the relation schema R (A, B, C, D) and a set of FD's: A→B; B→C; C→D; D→A, which of the following is true for R? |
| Answer | a. R is neither BCNF nor 3NF. |
| | b. R is BCNF but not 3 |
| | c. R is 3NF but not BCNF. |
| | ✓ d. R is both BCNF and 3NF. |
| | e. Cannot be determined from the given. |

17. **Multiple Choice: Given the relation schema R (A, B, C,...**

| | |
|---|---|
| Question | Given the relation schema R (A, B, C, D) and a set of FD's: A→B; B→C; C→D; D→A, which of the following is a minimal basis for R? |
| Answer | ✓ a. A → B; B → C; C → D; D → A |
| | b. A → B; A → C; C → D; C → A |
| | c. B → C; B → D; D → A; D → B |
| | d. A → B; A →D; D → C; D → A |
| | e. all of the others |

18. **Multiple Choice: Given R (A, B, C, D, E) with A → B; B...**

Question: :n R (A, B, C, D, E) with A → B; B →→ C; C → D; C → E, which of the following is the complete set of keys for R?

Answer:

a. ABC

b. AC

c. AC and BC

d. BC

e. ABC, AE, AD

19. **Multiple Choice: Given R (A, B, C, D, E) with A → B; B...**

Question: :n R (A, B, C, D, E) with A → B; B →→ C; C → D; C → E, which of the following is true?

Answer:

a. R is BCNF, 3NF and 4NF.

b. R is not BCNF, R is 3NF, R is 4NF.

c. R is not BCNF, R is not 4NF, R is 3NF.

d. R is not BCNF, R is not 4NF, R is not 3NF.

e. R is BCNF, R is not 3NF, R is 4NF.

20. **Multiple Choice: Given R (A, B, C, D, E) with A → B; B...**

Question: :n R (A, B, C, D, E) with A → B; B →→ C; C → D; C → E, which of the following is false?

Answer:

a. A →→ B and C →→ D and C →→ E are valid for R

b. A →→ CDE and B →→ ADE and C →→ ABE are valid for R

c. A → C is valid for R

d. C →→ D is valid f

e. all of the others are true

21. **Multiple Choice: Given R (A, B, C, D, E) with A → B; B...**

Question: Given R (A, B, C, D, E) with A → B; B →→ C; C → D; C → E, which of the following is true?

Answer:

a. R is 4NF and there is no need to decompose

b. AB and ACDE are 4F

c. AB, ACD and ACE are 4NF

d. AB, AC, CD and ACE are 4NF

e. AB, AC, CD, CE are 4NF

22. **Multiple Choice: Given R (A, B, C, D, E) with A → B; B...**

Question

:n R (A, B, C, D, E) with A → B; B →→ C; C → D; C → E, which of the following is true about dependency preservation?

Answer

a. None of the other choices.

b. AB, ACD and ACE preserves all FDs and MVDs.

c. AB, ACD and ACE preserves all FDs and MVDs.

d. AB, AC, CD and ACE preserves all FDs and MVDs.

e. AB, AC, CD, CE preserves all FDs and MVDs.

23. **Multiple Choice: Given R (A, B, C, D, E) with A → B; B...**

Question

Given R (A, B, C, D, E) with A → B; B →→ C; C → D; C → E, in which of the following decomposed relations can you enforce B→→C after a valid 4NF decomposition?

Answer

a. ACD

b. ACE

c. AB

d. BC

e. CE

24. **Multiple Choice: SQL: R ID name age 12 Ali 59 15 Pınar 23...**

Question

R

| ID | name | age |
|---|---|---|
| 12 | Ali | 59 |
| 15 | Pınar | 23 |
| 99 | Reyhan | 42 |

S

| ID | name | age |
|---|---|---|
| 15 | Pınar | 23 |
| 25 | Hayri | 40 |
| 98 | Reyhan | 20 |
| 99 | Reyhan | 42 |

Consider the above tables R and S. How many tuples are there in the result of the following SQL query?

```
SELECT ID
FROM R
WHERE age > ALL (SELECT age
                 FROM S
                 WHERE name = 'Ali');
```

Answer

a. 4

b. 3

c. 0

d. 1

25. **Multiple Choice: SQL: A schema for a database is given belo...**

Question

A schema for a database is given below.

| R | | |
|---|---|---|
| **ID** | **name** | **limit** |
| 0 | ceri | 5 |
| 1 | teri | 6 |
| 2 | seri | 7 |
| 3 | meri | 9 |

| S | | |
|---|---|---|
| **ID** | **type** | **numb** |
| 0 | X | 8200 |
| 1 | X | 8201 |
| 2 | Y | 8201 |
| 5 | X | 8203 |
| 1 | Y | 8204 |
| 3 | Y | 8202 |

What IDs are returned by the following SQL query for the above instance of the tables?

```
SELECT ID
FROM S R
WHERE type = 'X'
   AND EXISTS (SELECT *
               FROM R S
               WHERE S.limit > 5
                 AND S.ID = R.ID);
```

Answer

a. 1, 0

b. 1, 2

c. 1, 3

d. 1, 5

26. **Multiple Choice: SQL: Assuming that R and S are any two tab...** Points: 3

Question

Assuming that R and S are any two tables with a common attribute 'A' in their respective schemas, which one of the queries always gives the same answer as the query shown below?

SELECT * FROM R WHERE A IN (SELECT S.A FROM S);

Answer

a. SELECT R.* FROM R, S WHERE R.A = S.A;

b. SELECT DISTINCT R.* FROM R, S WHERE R.A = S.A;

c. SELECT R.* FROM R, (SELECT DISTINCT A FROM S) SP where R.A = SP.A;

d. none

27. **Multiple Choice: SQL: Consider a relation Items (name, pric...** Points: 3

Question

Consider a relation Items (name, price) which contains the names and prices of different items. Provided that no two items have the same price, what does the following SQL query return?

```
SELECT name
FROM Items I
WHERE (SELECT count (*) FROM Items WHERE price > I.price) < 3;
```

Answer

a. Names of the four most expensive items.

b. Names of the four cheapest items.

c. Names of the three most expensive items.

d. Names of the three cheapest items.

e. None

28. **Multiple Choice: SQL: Consider the following relational sch...** Points: 3

Question

Consider the following relational schema:

```
EMP (empID, name, deptID)
CUST (custID, name, salesRepID, rating)
```

salesRepId is a foreign key referring to empId of the employee relation. Assume that each employee makes a sale to at least one customer. What does the following query return?

```
SELECT name
FROM EMP E
WHERE NOT EXISTS (SELECT custID
                  FROM CUST C
                  WHERE C.salesRepID = E.empID
                    AND C.rating <> 'GOOD');
```

Answer

a. Names of all the employees with at least one of their customers having a 'GOOD' rating.

b. Names of all the employees with at most one of their customers having a 'GOOD' rating.

c. Names of all the employees with none of their customers having a 'GOOD' rating.

d. Names of all the employees with all their customers having a 'GOOD' rating.

29. **Multiple Choice: SQL: Consider the following relational sch...**

Question

Consider the following relational schemas:

Suppliers (sid:integer, sname:string, city:string, street:string)

Parts (pid:integer, pname:string, color:string)

Catalog (sid:integer, pid:integer, cost:real)

Consider the following relational query on the above database:

```
SELECT S.sname
FROM Suppliers S
WHERE S.sid NOT IN (SELECT C.sid
                    FROM Catalog C
                    WHERE C.pid NOT IN (SELECT P.pid
                                        FROM Parts P
                                        WHERE P.color <> 'blue'));
```

Assume that relations corresponding to the above schema are not empty. Which one of the following is the correct interpretation of the above query?

Answer

a. Find the names of all suppliers who have supplied a non-blue part.

b. Find the names of all suppliers who have not supplied a non-blue part.

c. Find the names of all suppliers who have supplied only blue parts.

d. Find the names of all suppliers who have not supplied only blue parts.

e. Find the names of all suppliers who have not supplied any blue parts.

30. **Multiple Choice: SQL: Consider the relation CE223Grades bel...**

Question

Consider the relation CE223Grades below.

| studentID | midtermScore | seminarScore |
|---|---|---|
| A | 45 | NULL |
| B | NULL | 90 |
| C | 100 | 80 |

The following query is also given:

```
SELECT studentID
FROM CE223Grades
WHERE (midtermScore > seminarScore AND seminarScore > 75 AND midtermScore > 90)
      OR (midtermScore < 50);
```

Which tuples are returned?

Answer

a. B and C only

b. A and C only

c. A only

d. A, B, and C

31. **Multiple Choice: SQL: Consider the relational schema EMP (I...**

Points: 3

Question

Consider the relational schema EMP (ID, name, department, salary) and the two queries Q1 and Q2 below. Provided that a department with name 'management' has more than one employee, and we want to find the employees who get higher salary than anyone in the 'management' department, which one of the statements is TRUE for any arbitrary instance of an EMP table?

```
Q1: SELECT e.ID
FROM EMP e
WHERE NOT EXISTS (SELECT *
                  FROM EMP s
                  WHERE s.department = 'management'
                        AND s.salary >= e.salary);
Q2: SELECT e.ID
FROM EMP e
WHERE e.salary > ANY (SELECT DISTINCT s.salary
                      FROM EMP s
                      WHERE s.department = 'management');
```

Answer

a. Q1 is the correct query.

b. Q2 is the correct query.

c. Both Q1 and Q2 produce the same answer.

d. Neither Q1 nor Q2 is the correct query.

32. **Multiple Choice: SQL: Database table by name R is given bel...**

Question

Database table by name R is given below.

| A | C | E |
|---|---|---|
| xxx | clin | 1234.00 |
| yyy | tlin | 4321.00 |
| zzz | clin | 3214.00 |

What is the output of the following SQL query?

```
SELECT count (S.*)
FROM ((SELECT A, C FROM R)
      NATURAL JOIN
      (SELECT C, E FROM R)) S;
```

Answer

a. 3

b. 9

c. 5

d. 6

e. 4

33. **Multiple Choice: SQL: The following query is given on R (A,...**

| | |
|---|---|
| Question | The following query is given on R (A, B, C, D).<br>SELECT [...]<br>FROM R<br>GROUP BY C, D;<br>Assuming that A, B, C, and D take integer values, which of the following can appear in the position marked as [...]?<br>I. MIN(A - B)<br>II. A, B<br>III. C, D |
| Answer | a. III only<br>b. I and III only<br>c. I, II, and III<br>d. None |

34. **Multiple Choice: SQL: same?: 40. The following SQL queries refer t...**

| | |
|---|---|
| Question | 40. The following SQL queries refer to relations R (A, B) and S (B, C).<br>Q1: SELECT * FROM R NATURAL JOIN S;<br>Q2: SELECT * FROM R LEFT NATURAL OUTER JOIN S; |
| Answer | a. Q1 and Q2 produce the same answer.<br>b. The answer to Q1 is always contained in the answer to Q2.<br>c. The answer to Q2 is always contained in the answer to Q1.<br>d. Q1 and Q2 produce different answers. |

35. **Multiple Choice: SQL: same?: In the following queries, the schema ...**

| | |
|---|---|
| Question | In the following queries, the schema is R (A, B).<br>Q1: SELECT MIN (A), MIN (B) FROM R;<br>Q2: SELECT * FROM R; |
| Answer | a. Q1 and Q2 produce the same answer.<br>b. The answer to Q1 is always contained in the answer to Q2.<br>c. The answer to Q2 is always contained in the answer to Q1.<br>d. Q1 and Q2 produce different answers. |

36. **Multiple Choice: SQL: same?: In the following queries, the schema ...**

| | |
|---|---|
| Question | In the following queries, the schema of relation R can be arbitrary.<br>Q1: (SELECT * FROM R)<br>UNION<br>(SELECT * FROM R);<br>Q2: SELECT * FROM R; |
| Answer | a. Q1 and Q2 produce the same answer.<br>b. The answer to Q1 is always contained in the answer to Q2.<br>c. The answer to Q2 is always contained in the answer to Q1.<br>d. Q1 and Q2 produce different answers. |

37. **Multiple Choice: SQL: same?: In the following, R has attribute A, ...**

| | |
|---|---|
| Question | In the following, R has attribute A, but its schema is otherwise not specified, nor it is relevant.<br>Q1: SELECT COUNT (A) FROM R;<br>Q2: SELECT COUNT (*) FROM R; |
| Answer | a. Q1 and Q2 produce the same answer.<br>b. The answer to Q1 is always less than or equal to the answer to Q2.<br>c. The answer to Q2 is always less than or equal to the answer to Q1.<br>d. Q1 and Q2 produce different answers. |

38. **Multiple Choice: SQL: same?: The following SQL queries refer to a ...**

| | |
|---|---|
| Question | The following SQL queries refer to a relation R (A, B).<br>Q1: SELECT A FROM R r1<br>WHERE EXISTS (SELECT * FROM R WHERE A = r1.B);<br>Q2: SELECT A FROM R<br>WHERE B = ANY (SELECT A FROM R); |
| Answer | a. Q1 and Q2 produce the same answer.<br>b. The answer to Q1 is always contained in the answer to Q2.<br>c. The answer to Q2 is always contained in the answer to Q1.<br>d. Q1 and Q2 produce different answers. |

39. **Multiple Choice: SQL: same?: The following SQL queries refer to a ...**

| | |
|---|---|
| Question | The following SQL queries refer to a relation R (A, B, C).<br>Q1: SELECT DISTINCT A, B FROM R;<br>Q2: SELECT A, B FROM R GROUP BY A, B; |
| Answer | ✓ a. Q1 and Q2 produce the same answer.<br>b. The answer to Q1 is always contained in the answer to Q2.<br>c. The answer to Q2 is always contained in the answer to Q1.<br>d. Q1 and Q2 produce different answers. |

40. **Multiple Choice: SQL: same?: We have the relational schema S (C, D...**

| | |
|---|---|
| Question | We have the relational schema S (C, D, E).<br>QueryX: SELECT D FROM S;<br>QueryY: (SELECT D FROM S) INTERSECT (SELECT D FROM S); |
| Answer | a. QueryX and QueryY produce the same answer.<br>b. The answer to QueryX is always contained in the answer to QueryY.<br>✓ c. The answer to QueryY is always contained in the answer to QueryX.<br>d. QueryX and QueryY produce different answers. |