

Q1. Given the following relation:

ID	Name	Email
01	Lee	Lee@gmail.com
02	Jordan	Jordan@xjtlu.net
03	Hugh	Hugh@163.com
07	Chris	Chris@live.com

The cardinality of this relation is [?]. The degree of this relation is [?].

Q2. Which of the following is/are true?

1. A table can have two primary keys.
2. Both unique key and primary key can prevent duplicate values
3. For a primary key involving 2 columns, one of the columns can have NULLs but not both.
4. A table can have no primary keys.

Q3. Given the following table x (a, b, c):

a (INT)	b (VARCHAR(5))	c (VARCHAR(40) BINARY)
1	'A'	'AAbbcc'
3	'b'	'DDEEFF'

Assume the primary key of this table is (A, B) and a unique key on column C. Which of the following statements is/are true?

1. Inserting (1, 'c', 'aabbcc') results in no errors.
2. Inserting (NULL, 2, 'gghhii') results in no errors.
3. Inserting (3, 'a', 'AAbbCC') results in no errors.
4. Inserting (1, 'aabbcc', 'AAbbCC') results in no errors.

Q4. Given the following table t(a, b, c):

c1 (INT)	c2 (INT)
1	2
2	4
3	3
4	3

After executing all of the following instructions in exactly the same order below:

DELETE FROM t WHERE c1 = 3;

INSERT INTO t (c2, c1) VALUES (2, 5), (4, 6), (5, 3), (3, 0);

UPDATE t SET c2=2, c1=c1+3 WHERE c1 in (0, 1, 2, 3);

DELETE FROM t WHERE c2 > 5;

The maximum value in column c1 will be [?]. The sum all values in c2 becomes [?]. There will be [?] instances of value 3 in this table.

Q5. Given table book(bookname, year)

bookname (varchar(255))	dop (date)
'Rise of Machines'	'2019-09-03'
'How Machines Work: An Interactive Guide'	'2003-03-08'
'Machine Learning for Hackers'	'2020-03-07'
'Deep Learning'	'2016-09-03'
'Machine maintenance and machine repair'	'2017-03-08'

Which of the following SELECT statement(s) can find the books called 'Machine maintenance and machine repair' and 'Rise of Machines'?

1. **SELECT bookname FROM book WHERE bookname LIKE '%machine%' and dop > '2016-01-01';**
2. SELECT bookname FROM book WHERE bookname LIKE '_machine_' and dop < '2019-10-01';
3. **SELECT bookname FROM book WHERE bookname LIKE '%machine%' and dop LIKE ' 01%';**
4. SELECT bookname FROM book WHERE bookname LIKE '%machine_machine%' and dop LIKE '%';
5. **SELECT bookname FROM book WHERE bookname LIKE '%e%machine%' and dop LIKE ' 0%';**

Q6. Given table x (a, b, c) and table y (d, e, f) with "foreign key (c) references y (d) on delete cascade on update set null". Which of the following queries has/have the same effect as "DELETE * FROM x"?

1. DELETE FROM x WHERE x.a = x.a;
2. DELETE FROM y;
3. UPDATE y SET f = 1; DELETE FROM x WHERE c IS NULL;
4. UPDATE x DELETE d, e, f;
5. UPDATE y DELETE d, e, f;
6. **UPDATE y SET d = d - 1; DELETE FROM x WHERE c IS NULL;**

Q7. Given table x (a, b) and table y (c) with primary key (a), foreign key "(b) references y (c)" and no NULLs in these tables. If both table x and y have a cardinality of 10, then column c

has maximumly [?] different values. Columns a, b and c have a minimum of [?] different values.

Q8. Given table x (a, b, c)

	a	b
1	1	2
2	2	3
3	3	4
4	4	5
5	5	6

Which row below does not exist in the result of query

“SELECT a + b, b - a FROM x WHERE x.a < (SELECT avg(b) FROM x);”?

1. (3, 1)
2. (5, 1)
3. (7, 1)
4. (9, 1)
5. (11, 1)

Q9. Which of the following statements always generate exactly the same set of tuples as “SELECT * FROM a” (ordering of tuples doesn't matter)? Assume that table `a` has a single column `col1` and table `b` has a single column `col2`. Both col1 and col2 are primary keys.

1. SELECT col1 FROM a CROSS JOIN b;
2. SELECT DISTINCT col1 FROM a CROSS JOIN b;
3. SELECT * FROM a WHERE col1 IN (SELECT * FROM a, b);
4. SELECT col1 FROM (SELECT * FROM a UNION SELECT * FROM b) as c;
5. SELECT col1 FROM a WHERE col1 in (SELECT * FROM b) UNION SELECT col1 FROM a WHERE col1 NOT in (SELECT * FROM b);

Q10. Given tables x (col) and y (col), which one(s) of the following statements can achieve the same effect as “SELECT * FROM x EXCEPT SELECT * FROM y”?

1. SELECT col FROM x WHERE col = ALL(SELECT col FROM y);
2. SELECT col FROM y WHERE col IN (SELECT col FROM x);
3. SELECT col FROM x WHERE col NOT IN y;
4. SELECT col FROM x WHERE col NOT IN (SELECT * FROM y);

Q11. Given table x (a, b) shown as below:

	a	b
1	1	1
2	1	2
3	2	4
4	2	3
5	3	3
6	3	8

After executing:

SELECT x1.b FROM x x1, x x2 WHERE x1.a = x2.a AND x1.b = x2.b - 1;

Which number(s) below is/are in the final result?

1. 1

2. 2

3. 3

4. 4

5. 8

Q12. Given a table x (a, b, c, d, e, f, g) with primary key (a, b) and functional dependencies:

b → c, d,

c → d

e → f

g → a

There are partial dependencies in this table and transitive dependencies in this table.

Q13. Which one of the following statements is correct about ER modelling?

1. Attributes can have entities but entities have no smaller parts

2. 1:1 relationship can help reduce redundancies in databases.

3. M:N relationships are difficult to represent in a database.

4. M:1 relationships are difficult to represent in a database.

Q14. "Each teacher teaches up to 2 modules. A module can be taught by 1 to 3 teachers", what is the cardinality ratio of teacher and module?

1. One-to-many

2. One-to-one

3. Many-to-many

4. Zero-to-zero

Q15. Which of the following statements about normalisation is/are true?

1. The determinant of a partial dependency can be 2 or more columns.

2. A table with 0 transitive dependencies is guaranteed to be in 3NF.
3. A table with its primary key containing a single column will not have partial dependencies.
4. A table in 2NF will never have update anomalies.

Q16. Which expression(s) below is/are evaluated to be unknown in 3-valued logic?

1. True AND Unknown
2. (False OR Unknown) OR (True OR Unknown)
3. (3 > Unknown) OR (3 < Unknown)
4. (9 + Unknown) / 3

Q17. Given two tables x (a, b, c) and y (a, d, e). Which of the following statements has/have exactly the same effect as "SELECT * FROM x NATURAL JOIN y"?

1. SELECT * FROM x INNER JOIN y ON (x.a = y.a);
2. SELECT * FROM x INNER JOIN y USING (x.a = y.a);
3. SELECT * FROM x INNER JOIN y ON (a);
4. SELECT * FROM x INNER JOIN y USING (a);

Q18. Which one of the following tables has a partial dependency?

1. For table (a, b, c, d) with primary key on column (a, b) and the dependency $b \rightarrow c$.
2. For table (a, b, c, d) with primary key on column (a, b) and the dependency $c \rightarrow d$.
3. For table (a, b, c, d) with primary key on column (a) and the dependency $c \rightarrow a$.
4. For table (a, b, c, d) with primary key on column (a) and the dependency $a \rightarrow d$.

Q19. Which of the following is/are not needed when defining a foreign key?

1. The data types of referenced columns and referencing columns must be compatible.
2. Referenced columns must be NOT NULL.
3. Referencing columns must either be a unique key or a primary key.
4. Referenced columns and referencing columns should not be in a same table.

Q20. Which of the following statement(s) result(s) no errors in MySQL? Assume that all table names, constraint names and column names exist.

1. "ALTER TABLE table REMOVE PRIMARY" removes a primary key.
2. "ALTER TABLE table DELETE UNIQUE name" removes a unique key.
3. "ALTER TABLE table DROP FOREIGN KEY name" removes a foreign key.
4. "ALTER TABLE table ADD COLUMN name" adds a column.