Quiz 1
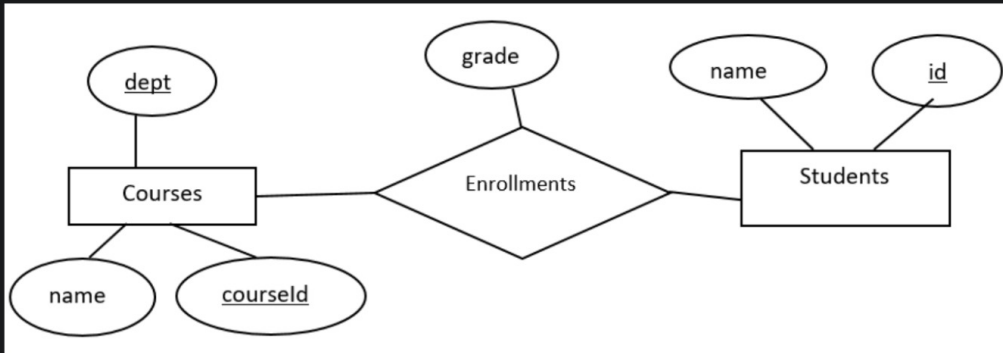
Which of the following relations is not correct?

○ A. Students (id, name)

◉ B. Courses (dept, courseId, name, grade)

○ C. Enrollments (dept, courseId, id, grade)

○ D. Courses (dept, courseId, name)

Question 2

Which of the following statements is TRUE about weak entity set?

I. The key for a weak entity set is its own underlined attributes and the keys for the supporting entity sets.
II. Every many-one relationship from a weak entity set need to be supporting.
III. Weak entity is represented by double rectangle.
IV. A weak entity set has one or more many-one relationships to other (supporting) entity sets.

○ A. II, III and IV

○ B. II and IV

◉ C. I, III, IV

○ D. I and III

Which of the following facts is TRUE according to the given semistructured data model?
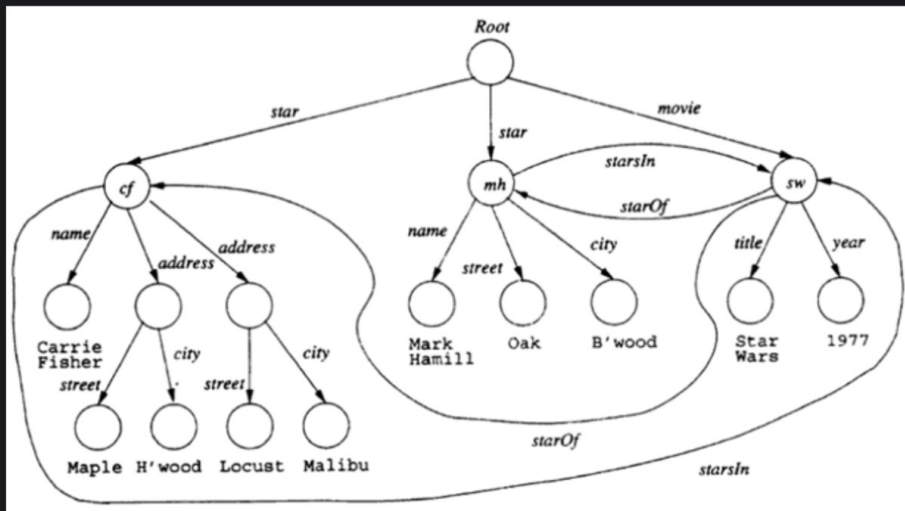
I. Carrie Fisher has two addresses.
II. Star Wars is produced in Hollywood.
III. Mark Hamill lives in Locust Street.
IV. Carrie Fisher and Mark Hamill both starred in Star Wars.

○ A. I and II

○ B. I, III and IV

○ C. II and III

◉ D. I and IV

Question 7

Which of the following is FALSE for relations?

○ A. The name of a relation and the set of attributes is called the schema for that relation.

◉ B. A tuple has multiple components for each attribute of the relation.

○ C. There may be several possible orders of tuples for the same relation.

○ D. The columns of a relation are named by attributes.

Question 8

Consider the following two commands C1 and C2 on the relation R from a relational database schema:
C1: DROP TABLE R;
C2: ALTER TABLE R DROP attribute1

Which of the following statements is/are TRUE?

I. Both C1 and C2 delete the schema for R.
II. No tuples of R can be accessible after C1.
III. C1 deletes not only all tuples of R, but also the schema for R.
IV. All tuples of R instance have the component for attribute1 deleted after C2.

○ A. II, III and IV

○ B. I and IV

○ C. III and IV

◉ D. I and II

Question 1

Which is a suitable schema for the relation `Customer(customerID, firstName, lastName, phone, homeAddress, workAddress, countryCode, accountBalance)` ?

○ A. `Customer (customerID:` **INT**`, firstName:` **VARCHAR(30)**`, lastName:` **VARCHAR(30)**`, phone:` **CHAR(15)**`, homeAddress:` **VARCHAR(60)**`, workAddress:` **VARCHAR(60)**`, countryCode:` **CHAR(3)**`, accountBalance:` **INT**`)`

○ B. `Customer (customerID:` **INT**`, firstName:` **VARCHAR(30)**`, lastName:` **VARCHAR(30)**`, phone:` **INT**`, homeAddress:` **VARCHAR(60)**`, workAddress:` **VARCHAR(60)**`, countryCode:` **CHAR(3)**`, accountBalance:` **REAL**`)`

○ C. `Customer (customerID:` **INT**`, firstName:` **VARCHAR(30)**`, lastName:` **VARCHAR(30)**`, phone:` **CHAR(15)**`, homeAddress:` **CHAR(15)**`, workAddress:` **CHAR(15)**`, countryCode:` **CHAR(3)**`, accountBalance:` **REAL**`)`

○ D. `Customer (customerID:` **INT**`, firstName:` **VARCHAR(30)**`, lastName:` **VARCHAR(30)**`, phone:` **CHAR(15)**`, homeAddress:` **VARCHAR(60)**`, workAddress:` **VARCHAR(60)**`, countryCode:` **CHAR(3)**`, accountBalance:` **REAL**`)`

Which of the following statements is not correct for given E/R diagram?
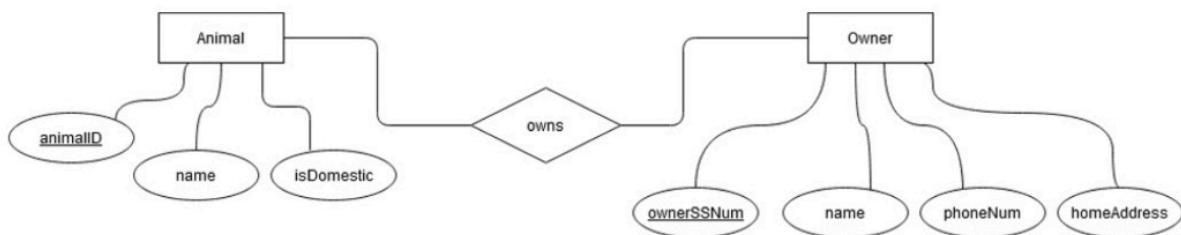
I. Animals can have multiple owners.
II. Owners can have multiple animals.
III. `name` attribute of `Animal` entity set can be a key, since all animals have unique names in real life.
IV. `phone` attribute of `Owner` entity set can be a key, since all owners can have only one phone number in real life.
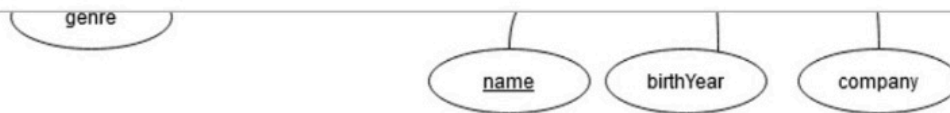
○ A. I, II and III

○ B. I, II and IV

○ C. I and II

○ D. III and IV

Question 5

Which one of the following is the correct relational database schema for given E/R diagram if you convert it using the object-oriented approach?
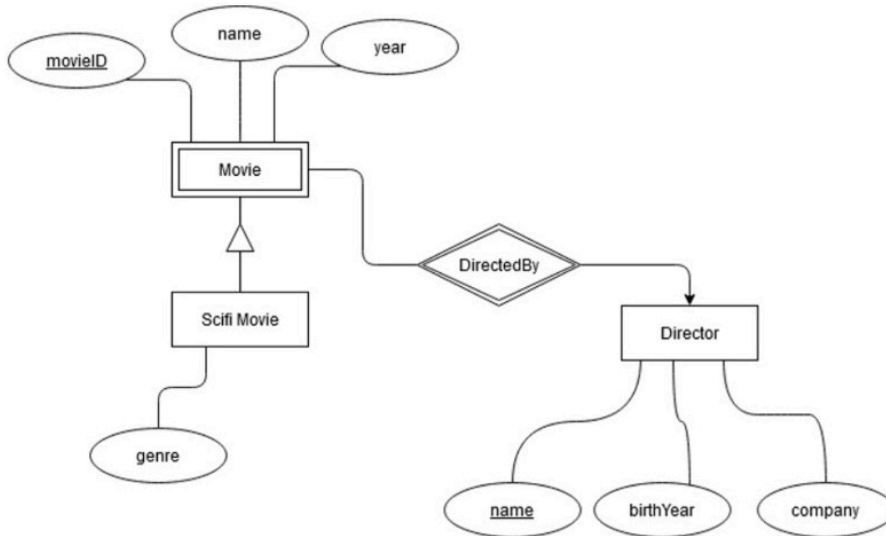
○ A. Director (**name**, birthYear, company)

   Movie (**movieID**, **directorName**, name, year)

   ScifiMovie (**movieID**, **directorName**, genre)

○ B. Director (**name**, birthYear, company)

○ A. Director (**name**, birthYear, company)

   Movie (**movieID**, **directorName**, name, year)

   ScifiMovie (**movieID**, **directorName**, genre)

◉ B. Director (**name**, birthYear, company)

   Movie (**movieID**, **directorName**, name, year)

   ScifiMovie (**movieID**, **directorName**, name, year, genre)

○ C. Director (**name**, birthYear, company)

   Movie (**movieID**, **directorName**, name, year, genre)

○ D. Director (**name**, birthYear, company)

   Movie (**movieID**, **directorName**, name, year)

   ScifiMovie (**movieID**, genre)
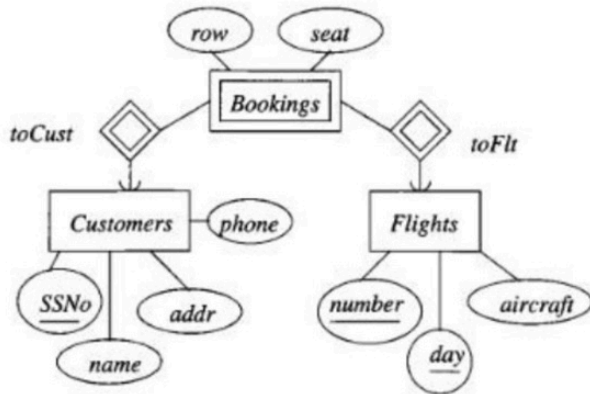
○ A. `Customers` is a strong entity.

○ B. After converting the given E/R diagram to relational data model, the corresponding relation for `Bookings` can be represented by the combination of attributes `SSNo, number` and `day`.

○ C. There are only two attributes in the given diagram that can be used as keys in the relational data model.

○ D. After converting the given E/R diagram to relational data model, the possible key for `Flights` relation is the combination of `number` and `day`.

Quiz 2

Question 1

Consider a relation R (X, V, Y, Z) with given FD's; XY → Z, YZ → X, X → V, Y → Z.

If BCNF decomposition is suitable for the relation R, which will be the resulting decomposed relation set that are all in BCNF?

◉ A. R_1 (X, Y), R_2 (X, V) and R_3 (V, Y, Z)

○ B. R_1 (V, Y), R_2 (V, Z) and R_3 (X, Y, Z)

○ C. R_1 (X, V) and R_2 (X, Y, Z)

○ D. R_1 (X, Y) and R_2 (X, V, Z)

Question 2

Consider a relation R (A, B, C, D) with AC→→ B, C→ D given. Which of the following statements are TRUE about the relation R?

   I. Key is AC.
   II. R_1 (A, B, C), R_2 (C, D) are the decomposed relation schema after decomposition to 4NF.
   III. R_1 (A, B, C), R_2 (A, C) are the decomposed relation schema after decomposition to 4NF.
   IV. AC →→ B is a trivial MVD for the assumed decomposed relation R_1 (A, B, C).

◉ A. I and III

○ B. II and IV

○ C. I and II

○ D. III and IV

Consider a relation R (A, B, C, D) with given FD's; AB → D, BC → D, AD → B, BD → C.

If 3NF decomposition suitable for the relation R, which of the following option gives the maximum number of FDs not violating 3NF for R?

I. AB → D
II. BC → D
III. AD → B
IV. BD → C

A. I and II

B. I, II and III

C. I, III and IV

D. II and III

Question 4

Which of the following statements are FALSE about a relation R?

I. If R is in 4NF, then it is also in BCNF.
II. If R is in BCNF, then it is also in 4NF.
III. If R is in 3NF, then it is also in BCNF.

A. II and III

B. I, II and III

C. Only I

D. Only II

Consider a relation R (A, B, C, D, E) with given FD's; AB → E, E → D, D → C, DE → B, C → A.

Without regard to whether an actual decomposition to BCNF is to be performed or not, which of the following FD's are not BCNF violations for R?

I. AB → E
II. D → C
III. DE → B
IV. C → A

A. Only IV

B. I and III

C. II and IV

D. I, II and IV

Consider a relation R (A, B, C, D) with given MVD's; A →→ C, C →→ BD.

Which of the following option would correspond to a series of relation schema resulting from a decomposition of R to 4NF as necessary?

A. Decomposition is not necessary. R is in 4NF.

B. R_1 (A, C), R_2 (A, B, D) and R_3 (C, D)

C. R_1 (A, C), R_2 (A, B, D)

D. R_1 (B, C, D) and R_2 (A, B, D)

What will be the minimal basis for the relation R (A, B, C, D) with given FD's; ABC → B, BD → AC, C → B, BD → A, B → A, CD → D, BD → C, C → A?

- A. C → A, B → A, BD → C
- B. B → A, BD → A, BD → C
- ● C. C → B, B → A, BD → C
- D. C → B, B → A, BD → A

Which of the following statements is <u>TRUE</u> about the chase test?

I. If we ever get an unsubscripted row, we know that the join of the decomposed relations is lossless.
II. We can only use the chase test if we have more than three decomposed relations.
III. To use the chase test to prove or disprove lossless join property, we need to know the sub-relations that are decomposed from the original relation.
IV. If the chase test is not used, there is no way that we can use to check dependency preservation in the decomposed sub-relations.

- A. I, II and IV
- B. I and II
- C. II, III and IV
- ● D. I and III

Quiz 3

Question 1

Consider the following tables:

```
Flights(flightNum, sourceCity, destinationCity)
Departures(flightNum, date, planeType)
Passenger(passengerID, passengerName, passengerAddress)
Booking(passengerID, flightNum, date, seatNumber)
```

Which can be the correct query for finding the passengers' names who live in "New York" and has letter "S" in his/her name?

- A. `SELECT passengerName FROM Passenger WHERE passengerName LIKE '%S%' AND passengerAddress = '%New York%';`
- B. `SELECT passengerName, passengerAddress FROM Passenger WHERE passengerName = '%S' AND passengerAddress = '%New York%';`
- ● C. `SELECT passengerName FROM Passenger WHERE passengerName LIKE '%S%' AND passengerAddress LIKE '%New York%';`
- D. `SELECT passengerName FROM Passenger WHERE passengerName LIKE 'S%' AND passengerAddress LIKE '%New York%';`

Question 2

12.5 points ✔ Saved

Consider the following database table for an imaginary `World` database schema:

```
Country (Code: CHAR(3), Name: CHAR(52), Continent: CHAR(26), Region: CHAR(26), SurfaceArea: FLOAT(10,2), IndepYear: SMALLINT(6), Population:
INT(11), LifeExpectancy: FLOAT(3,1), GNP: FLOAT(10,2), GovernmentForm: CHAR(45), HeadOfState: CHAR(60), Capital: INT(11))
```

Which of the following correctly expresses the query to find all 3-tuples of the form c_1, c_2, y; where c_1 and c_2 are the names of the countries with the same independence year y?

- A. `SELECT COUNT(C1.Name), C1.IndepYear, C2.Name`
  `FROM country C1, country C2`
  `WHERE C1.IndepYear = C2.IndepYear`
  `AND C1.Code != C2.Code;`
- ● B. `SELECT C1.Name, C2.Name, C1.IndepYear`
  `FROM country C1, country C2`
  `WHERE C1.IndepYear = C2.IndepYear`
  `AND C1.Code != C2.Code;`
- C. `SELECT C1.Name, C2.Name, C1.IndepYear`
  `FROM country C1, country C2`
  `WHERE C1.IndepYear = C2.IndepYear`
  `AND C1.Code = C2.Code;`
- D. `SELECT COUNT(C1.Name), COUNT(C2.Name), C1.IndepYear`
  `FROM country C1, country C2`
  `WHERE C1.IndepYear = C2.IndepYear`
  `AND C1.Code = C2.Code;`

Consider the following data tuples:

Ramillies	1917	8
Renown	1916	6
Repulse	1916	6
Resolution	1916	8
Revenge	1916	8
Royal Oak	1916	8
Royal Sovereign	1916	8

If these tuples are a result for a database query, which of the following queries is correct assuming the existence of an imaginary `Ships` database?

○ A. `SELECT ships.name, ships.launched, classes.numGuns`
　　`FROM ships, classes`
　　`WHERE ships.displacement> 1915`
　　`AND classes.bore< 9`
　　`AND ships.name = classes.class;`

○ B. `SELECT ships.name, ships.launched, classes.numGuns`
　　`FROM ships, classes`
　　`WHERE ships.launched > 1915`
　　`AND classes.bore> 9`
　　`AND ships.class = classes.class;`

○ C. `SELECT ships.launched, ships.name, classes.numGuns`
　　`FROM ships, classes`
　　`WHERE ships.launched < 1920`
　　`AND classes.numGuns < 9`
　　`AND ships.class = classes.class;`

◉ D. `SELECT ships.name, ships.launched, classes.numGuns`
　　`FROM ships, classes`
　　`WHERE ships.launched > 1915`
　　`AND classes.numGuns < 9`
　　`AND ships.class = classes.class;`

Consider the following database tables:
`Courses`

Course Code	Student ID	Lecturer ID
CE 111	123456	305
CE 222	123457	306
CE 333	123458	307

--
`Students`

ID	Student Name	Country
123456	Mary	England
123457	Jane	Mexico
123459	Antonio	Spain

Choose the correct `JOIN` clause to select all the records from the `Students` table plus all matching rows in the `Courses` table over the student ID and ID attributes of the respective tables:

○ A. `SELECT *`
　　`FROM Courses`
　　`LEFT JOIN Students`
　　`ON Courses.StudentID = Students.ID;`

○ B. `SELECT *`
　　`FROM Courses`
　　`INNER JOIN Students`
　　`ON Courses.StudentID = Students.ID;`

○ C. `SELECT *`
　　`FROM Courses`
　　`FULL OUTER JOIN Students`
　　`ON Courses.StudentID = Students.ID;`

◉ D. `SELECT *`
　　`FROM Courses`
　　`RIGHT JOIN Students`
　　`ON Courses.StudentID = Students.ID;`

Which of the following is <u>FALSE</u> about the COUNT function in SQL?

○ A. `COUNT(col)` returns the number of rows with non-null values for the column `col`.

○ B. `COUNT(DISTINCT col)` returns the number of unique rows with non-null values for the column `col`.

○ C. `COUNT(*)` function counts all the tuples in the relation that is constructed from the `FROM` clause and `WHERE` clause of the query.

◉ D. `COUNT(*)` returns the number of rows with non-null values in a database table.

Consider the following tables:

`Student(`<u>id</u>`, name)`
`Professor(`<u>id</u>`, name, department)`
`Course(`<u>number</u>`, instructorID, title, credits, roomNumber)`
`Enroll(`<u>studentID</u>`, `<u>courseNumber</u>`)`
`Room(`<u>number</u>`, capacity)`

Which can be the correct query for finding the number of distinct courses that are being taken by the student whose name is "Tony Stark"?

○ A. `SELECT DISTINCT e.courseNumber FROM Enroll e, Student s WHERE e.studentID = s.id AND s.name = 'Tony Stark';`

◉ B. `SELECT COUNT (DISTINCT e.courseNumber) FROM Enroll e, Student s WHERE e.studentID = s.id AND s.name = 'Tony Stark';`

○ C. `SELECT COUNT (DISTINCT s.id) FROM Enroll e, Student s WHERE e.studentID = s.id AND s.name = 'Tony Stark';`

○ D. `SELECT COUNT (e.courseNumber) FROM Enroll e, Student s WHERE e.studentID = s.id AND s.name = 'Tony Stark';`

Question 7

Consider the following tables:

```
Customer(customerID, customerName, address, country, phone)
Invoice(invoiceID, customerID, orderID, invoiceDate, discount)
Product(productID, productName, unitPrice)
Order(orderID, productID, customerID, paymentType, date)
```

Which query below correctly finds, for each possible invoice date, the number of invoices that has a discount of more than $100?

○ A. SELECT invoiceDate, COUNT(invoiceID) FROM Invoice WHERE discount > 100 GROUP BY discount;

● B. SELECT invoiceDate, COUNT(invoiceID) FROM Invoice WHERE discount > 100 GROUP BY invoiceDate;

○ C. SELECT invoiceDate, invoiceID FROM Invoice WHERE discount > 100 GROUP BY invoiceDate;

○ D. SELECT invoiceID, COUNT(invoiceDate) FROM Invoice WHERE discount > 100 GROUP BY invoiceDate;

Question 8

Which of the following statements can be TRUE about the following SQL query if you assume that there are sufficient data in mentioned database tables?

```
SELECT Continent, SUM(SurfaceArea)
FROM Country
WHERE IndepYear > 1919
AND Capital IN (SELECT ID
                FROM City
                WHERE Population < 500000)
GROUP BY Continent;
```

I. The query returns more than one row if there are more than one continent in `Country` table.
II. There are at least two database tables present at the schema according to the given query.
III. This query gives an error due to the wrong usage of `SUM(..)` aggregation function.
IV. Data type of `Capital` column in subquery should be same with `ID` column of `City` table if the query returns a result.

○ A. I and III

● B. I, II and IV

○ C. I and II

○ D. II, III and IV

Quiz 4

Question 1

Consider the following database trigger:

```
CREATE TRIGGER AvgPriceTrigger
AFTER UPDATE OF price ON Laptop
REFERENCING
        OLD TABLE AS OldStuff,
        NEW TABLE AS NewStuff
FOR EACH STATEMENT
WHEN (1500 > (SELECT AVG(price) FROM Laptop))
BEGIN
        DELETE FROM Laptop
        WHERE (model, speed, ram, hd, screen, price) IN NewStuff;
        _____

END;
```

Which statement can be in the missing part that is denoted with an underline if it is intended to undo the effects of the update operation when the average price of the laptops goes below 1500 ?

● A. INSERT INTO Laptop (SELECT * FROM OldStuff)

○ B. DELETE model FROM Laptop WHERE (model, speed, ram, hd, screen, price) IN OldStuff

○ C. INSERT INTO Laptop (SELECT * FROM NewStuff)

○ D. DELETE * FROM Laptop WHERE model IN OldStuff

Question 2

Consider the following PSM function in SQL:

```
CREATE FUNCTION getNumOfLowerPricePCs(iprice INT)
                            RETURNS INTEGER
DECLARE NumOfPCs INT;

BEGIN
    SELECT COUNT(*) INTO NumOfPCs FROM PC WHERE price < iprice;
    RETURN (NumOfPCs);
END;
```

Which of the following statements can be TRUE according to the given PSM function?

I. It returns the number of PCs whose prices are lower than argument `iprice`.
II. If you want to call this function, an example usage can be `CALL getNumOfLowerPricePCs(price1);`
III. `NumOfPCs` can be used as an argument for the function.
IV. `NumOfPCs` must be declared between `BEGIN` and `END` keywords.

○ A. I and IV

○ B. I, II and III

● C. I and II

○ D. I. II and IV

Question 3

Which keyword is used to create a variable in a stored procedure?

○ A. `UPDATE`

○ B. `CURSOR FOR`

◉ C. `DECLARE`

○ D. `INSERT`

Question 4

Consider the following database tables:

```
Student (ID: INT, Name: CHAR(40), Email: VARCHAR(60))
Lecture (ID: INT, Name: CHAR(30), Department: CHAR(30))
StudentLecture (StudentID: INT, LectureID: INT, Grade: INT)
```

How can you declare referential integrity constraints for the table `StudentLecture` in MySQL? Handle the modifications on `StudentID` of `StudentLecture` by allowing the change and handle the deletions on the same column by setting the affected tuples to null.

◉ A. ```
ALTER StudentLecture
ADD CONSTRAINT stulect_stu_id_fk
FOREIGN KEY (StudentID)
REFERENCES Student (ID)
ON DELETE SET NULL
ON UPDATE CASCADE;
```

○ B. ```
ALTER StudentLecture
ADD CONSTRAINT stulect_stu_id_fk
FOREIGN KEY (ID)
REFERENCES StudentLecture (StudentID)
ON DELETE SET NULL
ON UPDATE CASCADE;
```

○ C. ```
ALTER StudentLecture
ADD CONSTRAINT stulect_stu_id_fk
FOREIGN KEY (StudentID)
REFERENCES Student (ID)
ON DELETE CASCADE
ON UPDATE SET NULL;
```

○ D. ```
ALTER StudentLecture
ADD CONSTRAINT stulect_stu_id_fk
FOREIGN KEY (StudentID)
REFERENCES Lecture (ID)
ON DELETE CASCADE
ON UPDATE CASCADE;
```

Question 5

Consider the following database table:

```
Student (ID: INT, Name: CHAR(40), Lecture: CHAR(30), Grade: INT)
```

If you want to display the student names whose grades are greater than 60 points and count all the rows for the same condition for this table by using a stored procedure in MySQL, which can be the correct procedure?

○ A. ```
CREATE PROCEDURE getStudentGradeAndCount ()
    BEGIN
        SELECT * FROM Student WHERE Grade > 60;
        SELECT ID FROM Student WHERE Grade > 60;
    END
```

○ B. ```
DELIMITER &&
CREATE PROCEDURE getStudentGradeAndCount ()
    BEGIN
        SELECT * FROM Student WHERE Grade > 60;
        SELECT COUNT(ID) FROM Student WHERE Grade < 60;
    END &&
DELIMITER ;
```

○ C. ```
DELIMITER &&
CREATE PROCEDURE getStudentGradeAndCount ()
    BEGIN
        SELECT Name FROM Student WHERE Grade > 60;
        SELECT COUNT(ID) FROM Student WHERE Grade < 60;
    END &&
DELIMITER ;
```

◉ D. ```
DELIMITER &&
CREATE PROCEDURE getStudentGradeAndCount ()
    BEGIN
        SELECT Name FROM Student WHERE Grade > 60;
        SELECT COUNT(ID) FROM Student WHERE Grade > 60;
    END &&
DELIMITER ;
```

Question 6

What is *y* in the following MySQL statement fragment?

```
CREATE TRIGGER x
AFTER UPDATE ON y
FOR EACH ROW
z
```

○ A. Delete statement

○ B. Trigger name

◉ C. Table name

○ D. Trigger statement

Question 7

Consider the following database schema:

```
Customer (custNo: INT, name: CHAR(30), addr: CHAR(60), rating: INT)
Novel (ISBN: VARCHAR(12), title: CHAR(30), author: CHAR(30), genre: CHAR(20))
Offering (ISBN: VARCHAR(12), sellerID: INT, price: REAL)
Purchase (ISBN: VARCHAR(12), sellerID: INT, buyerID: INT, year: INT)
```

Given a customer number `custNo`, which can be the correct PSM function in SQL that returns the total number of novels that have been bought by that customer?

- ⦿ A. ```
CREATE FUNCTION CustomerActivity (icustNo INTEGER) RETURNS INTEGER
    DECLARE Nnovels INT;
    BEGIN
        SET Nnovels = (SELECT COUNT(*) FROM Purchase WHERE buyerID = icustNo);
        RETURN (Nnovels);
    END;
```
- ◯ B. ```
CREATE FUNCTION CustomerActivity (icustNo INTEGER) RETURNS INTEGER
    DECLARE Nnovels CHAR(3);
    BEGIN
        SELECT COUNT(*) INTO Nnovels FROM Purchase WHERE buyerID = icustID;
        RETURN (Nnovels);
    END;
```
- ◯ C. ```
CREATE FUNCTION CustomerActivity (icustNo INTEGER) RETURNS INTEGER
    DECLARE Nnovels INT;
    BEGIN
        SELECT COUNT(*) INTO Nnovels FROM Purchase WHERE buyerID = icustID;
        RETURN (Nnovels);
    END;
```
- ◯ D. ```
CREATE FUNCTION CustomerActivity (icustNo INTEGER) RETURNS INTEGER
    DECLARE Nnovels INT;
    BEGIN
        SET Nnovels = (SELECT COUNT(*) FROM Customer WHERE custNo = icustNo);
        RETURN (Nnovels);
    END;
```

Question 8

Which type of statement does not execute SQL triggers?

- ◯ A. UPDATE
- ⦿ B. SELECT
- ◯ C. INSERT
- ◯ D. DELETE

Question 9

Which stored procedure argument mode enables the caller to pass in a value and get back a value?

- ◯ A. OUTGET
- ◯ B. OUT
- ◯ C. IN
- ⦿ D. INOUT

Question 10

Which statement can be used to remove a trigger from a database?

- ◯ A. DELETE
- ⦿ B. DROP
- ◯ C. REMOVE
- ◯ D. CLEAR