**Module 3**

**The Relational Model: SQL**

**Solutions**

Review Questions

Problems

1. Which of the following is *not* an Access SQL data type?
   1. TEXT
   2. SHORT
   3. LONG
   4. DECIMAL
2. Which of the following is *not* a valid comparison operator?
   1. =
   2. <=
   3. ||
   4. < >
3. Which of the following is true?
   1. Criteria joined by OR always select fewer records than if joined by AND.
   2. Criteria joined by AND always select fewer records than if joined by OR.
   3. Criteria joined by OR criteria may select more records than if joined by AND.
   4. If a record is true for two criteria joined by an OR, it is displayed twice in the results.
4. Which of the following is *not* true about a computed or calculated field?
   1. A calculated field creates a new piece of information for each record.
   2. A calculated field starts by determining how to group the records.
   3. A calculated field may use data from numeric fields.
   4. A calculated field may use data from text fields.
5. Which SQL operator can be rewritten with >= AND <= operators?
   1. BETWEEN
   2. CONTAINS
   3. IN
   4. WITH

6. Which SQL operator provides a concise way of creating a condition to match a specific list of criteria?

1. BETWEEN
2. CONTAINS
3. IN
4. NOT

7. Which of the following is *not* an aggregate function used to calculate information on groups of records?

1. SUM
2. MIN
3. COUNT
4. SUBTOTAL

8. Which SQL clause sorts the selected records in ascending order by FirstName within LastName?

a. ORDER BY FirstName, LastName

b. ORDER BY FirstName, LastName ASC

c. ORDER BY LastName, FirstName

d. ORDER BY LastName & FirstName

9. Which SQL clause would join a Customers table with an Orders table assuming that they are related in a one-to-many relationship on a field called CustID in both tables?

a. WHERE Customers.CustID = Orders.CustID

b. WHERE Customers = Orders AND CustID = CustID

c. WHERE Customers.CustID & Orders.CustID

d. WHERE IN Customers, Orders (CustID)

10. Which SQL keyword starts an SQL statement to select fields and records from one or more related tables?

a. LIST

b. SELECT

c. SORT

d. SUM

11. Which SQL keyword(s) start an SQL statement to append a new record to a table?

a. ADD

b. APPEND

c. CONCATENATE

d. INSERT INTO

12. Which SQL keyword identifies the tables that are involved in a SELECT query?

a. FROM

b. HAVING

c. TABLE

d. WHERE

13. Which symbol is a wildcard representing any number of characters?

a. \*

b. < >

c. &

d. #

14. The \_\_\_\_\_ operator allows you to select the records that match each condition separately, and then combine them into a single view.

a. COMBINE

b. MATCH

c. UNION

d. MERGE

15. What is another term for a subquery?

a. outer query

b. inner query

c. union query

d. aggregate query

16. Which of the following is the most sought-after language for programmers, according to codingsight.com?

a. C++

b. Java

c. Python

d. SQL

Critical Thinking Questions

1. What would be a good Access SQL data type for a Phone Number field?

Phone numbers typically contain only numbers but should still be created as TEXT (CHAR or VARCHAR) fields, given they do not represent numeric information and will never be used in calculations. Creating a phone number field as a text field also allows you to enter textual characters such as 800EATBEEF instead of 8003282333 as the field value. In addition, a text field would preserve a leading 0 digits if needed.

JC Consulting Case Exercises

The following exercises are based on the JCConsulting database. You may use the database to help answer these questions or refer back to the data shown in the figures of Modules 1, 2, and 3 of the textbook.

1. What SQL statement lists only the EmployeeID, LastName, and FirstName fields of all employees in the Employees table?
   1. SELECT \*   
      FROM Employees;
   2. SELECT EmployeeID, LastName, FirstName   
      FROM Employees;
   3. SELECT EmployeeID, LastName, FirstName   
      INTO Employees;
   4. SELECT EmployeeID, LastName, FirstName   
      WHERE Employees;
2. What SQL statement lists all the fields from the records in the TaskMasterList table with a CategoryID of Database?
   1. SELECT \*   
      FROM TaskMasterList;
   2. SELECT \*   
      FROM TaskMasterList   
      WHERE Count(\*) > 1;
   3. SELECT \*   
      FROM TaskMasterList   
      WHERE CategoryID = 'Database';
   4. SELECT CategoryID   
      FROM TaskMasterList   
      WHERE CategoryID = 'Database';
3. Which SQL command would be used to join the TaskMasterList and ProjectLineItems tables?
   1. CONNECT
   2. COMBINE
   3. LINK
   4. WHERE
4. Which SQL keyword would be used to find all TaskMasterList records with a CategoryID field value of Testing or Support?
   1. AND
   2. ORDER
   3. &&
   4. OR
5. Which SQL command would be used to sort all TaskMasterList records in ascending order based on the value of their TaskID within CategoryID?
   1. ORDER BY CategoryID, TaskID
   2. ORDER BY TaskID, CategoryID
   3. SORT CategoryID, TaskID
   4. SORT BY TaskID IN CategoryID
6. Which SQL keyword would be used to select all records except those with a Per field value of Hour?
   1. WHERE NOT Per = 'Hour'
   2. WHERE Per = 'Hour'
   3. SELECT NOT Per = 'Hour'
   4. SELECT \* EXCEPT 'Hour'
7. What data types would you assign to the City and Zip fields when creating the Zips table?
   1. TEXT to City and SHORT to Zip
   2. LONGTEXT to City and TEXT to Zip
   3. TEXT to City and TEXT to Zip
   4. SHORT to City and SHORT to Zip
8. Which SQL statement calculates the Bonus field in the Employees table as 10 percent of Salary?
   1. SELECT Salary \* 0.1 AS Bonus  
      FROM Employees;
   2. SELECT Bonus AS Salary \* 0.1  
      FROM Employees;
   3. SELECT \*  
      FROM Employees  
      WHERE Bonus = Salary \* 0.1;
   4. SELECT Salary \* 0.1 = Bonus  
      FROM Employees;
9. Which SQL statement lists the job titles at JCC and displays the number of employees that have each title?
   1. SELECT Title, COUNT(\*) AS CountOfTitle  
      FROM Employees  
      GROUP BY Title;
   2. SELECT Title, COUNT(\*) AS CountOfTitle  
      FROM Employees;
   3. SELECT Title, COUNT(\*) AS CountOfTitle  
      FROM Employees  
      HAVING Title;
   4. SELECT Title, COUNT(\*) AS CountOfTitle  
      FROM Employees  
      ORDER BY Title;
10. Which SQL statement lists the last names and salaries of employees who have a Salary field value less than Amir Nasser, EmployeeID 72?
    1. SELECT LastName, Salary  
       FROM Employees  
       WHERE Salary <   
       UNION  
        SELECT LastName, Salary  
        FROM Employees  
        WHERE EmployeeID = '72';
    2. SELECT LastName, Salary  
       FROM Employees  
       WHERE Salary <   
       UPDATE  
       SET EmployeeID = '72';
    3. SELECT LastName, Salary  
       FROM Employees  
       HAVING Salary < EmployeeID = '72';
    4. SELECT LastName, Salary  
       FROM Employees  
       WHERE Salary <  
        (SELECT Salary  
        FROM Employees  
        WHERE EmployeeID = '72');

Critical Thinking Questions

1. What would the WHERE clause look like in a SELECT query that selects fields from the TaskMasterList, ProjectLineItems, and Projects tables?

WHERE TaskMasterList.TaskID = ProjectLineItems.TaskID

AND Projects.ProjectID = ProjectLineItems.ProjectID

1. Use the terms primary key field, foreign key field, one-to-many relationship, parent table and child table to describe the following WHERE clause:

WHERE Clients.ClientID = Projects.ClientID

The ClientID field is the primary key field in the Clients (parent) table and the foreign key field in the Projects (child) table that creates the one-to-many relationships between the tables.

Pitt Fitness Case Exercises

The owner of Pitt Fitness used to work in the field of information technology and knows the importance of SQL in answering questions about the company data. Any of the queries you performed with the Access QBE, you can do in SQL. For each of the following questions, use SQL to provide an answer either by using the data shown in Figures 1-15 through 1-19 or by using a copy of the Pitt Fitness database. You can test the SQL statements in SQL View in Access, or write the SQL on paper.

1. Write the SQL code for the following: List the class name, room, location, day, and time for all classes.
   1. SELECT \*   
      FROM Classes;
   2. SELECT ClassName, Room, Location, Day, Time   
      IN Classes;
   3. SELECT ClassName, Room, Location, Day, Time   
      FROM Classes;
   4. SELECT ClassName, Room, Location, Day, Time   
      WITHIN Classes;
2. Write the SQL code for the following: Display the last names of the customers who have registered for a class on 1/2/2021.
   1. SELECT Customers.LastName, Reservations.ClassDate   
      FROM Customers   
      ADD Customers.CustomerID = Reservations.CustomerID AND Reservations.ClassDate='1/2/2021';
   2. SELECT Customers.LastName, Reservations.ClassDate   
      FROM Customers, Reservations   
      WHERE Customers.CustomerID = Reservations.CustomerID AND Reservations.ClassDate=#1/2/2021#;
   3. SELECT Customers.LastName, Reservations.ClassDate   
      FROM Customers, Reservations   
      WHERE Customers.CustomerID = Reservations.CustomerID WITH Reservations.ClassDate=#1/2/2021#;
   4. SELECT Customers.LastName, Reservations.ClassDate   
      FROM Customers, Reservations   
      WHERE Customers.CustomerID = Reservations.CustomerID INCLUDE Reservations.ClassDate=#1/2/2021#;
3. Write the SQL code for the following: Display the last name and street address of the customers who live on Negley.
   1. SELECT LastName, StreetAddress   
      FROM Addresses   
      WHERE StreetAddress LIKE "\*Negley\*";
   2. SELECT LastName, StreetAddress   
      FROM Customers   
      WHERE StreetAddress='Negley';
   3. SELECT LastName, StreetAddress   
      WHERE StreetAddress LIKE "\*Negley\*";
   4. SELECT LastName, StreetAddress   
      FROM Customers   
      WHERE StreetAddress LIKE "\*Negley\*";
4. Write the SQL code for the following: Count the number of reservations for 1/3/2021 and display that number with a CountOfReservationID heading.
   1. SELECT COUNT(ReservationID) AS CountOfReservationID   
      FROM Reservations   
      WHERE ClassDate=#1/3/2021#;
   2. SELECT CountOfReservationID   
      FROM Reservations   
      WHERE ClassDate=#1/3/2021#;
   3. SELECT COUNT AS CountOfReservationID   
      FROM Reservations   
      WHERE ClassDate=#1/3/2021#;
   4. SELECT COUNT OF ReservationID AS CountOfReservationID   
      FROM Reservations   
      WHERE ClassDate=#1/3/2021#;
5. Write the SQL code that answers the following question: Which instructors (showing last name only) live in zip code 15217?
   1. SELECT LastName   
      FROM Instructors   
      WHERE InstructorZipCode = '15217';
   2. SELECT InstructorLastName   
      FROM Instructors   
      WHERE InstructorZipCode = 15217;
   3. SELECT InstructorLastName   
      FROM Instructors   
      WHERE InstructorZipCode = "15217";
   4. SELECT InstructorLastName   
      FROM Instructors   
      WHERE InstructorZipCode = &15217&;
6. Write the SQL code that answers the following question: Which classes are scheduled for Wednesdays at the Downtown location? List the class name, the day, and the location.
   1. SELECT ClassName   
      FROM Classes   
      WHERE Day='Wednesday' AND Location='Downtown';
   2. SELECT ClassName, Day, Location   
      FROM Classes   
      WHERE Day='Wednesday' AND Location='Downtown';
   3. SELECT ClassName, Day, Location   
      WHERE Day='Wednesday' AND Location='Downtown';
   4. SELECT \*   
      FROM Classes   
      WHERE Day='Wednesday' AND Location='Downtown';
7. What SELECT statement would you use in a longer query to calculate the amount of money earned by each instructor based on the length of time for the class and $20 per hour. Display the instructor’s last name and the amount earned.
   1. SELECT InstructorLastName, LengthofTime\*20 AS Amount Earned
   2. SELECT InstructorLastName, LengthofTime/60\*20 AS Earnings OF Instructor
   3. SELECT InstructorLastName, LengthofTime/60\*20 AS AmountEarned
   4. SELECT InstructorLastName, JOIN LengthofTime/60\*20 AS Amount Earned
8. Write the SQL code for the following: Update all class prices to reflect a 1% increase.
   1. UPDATE Reservations   
      SET ClassPrice = ClassPrice\*1.10;
   2. UPDATE Reservations   
      SET ClassPrice = ClassPrice\*1%;
   3. UPDATE Reservations   
      SET ClassPrice = ClassPrice\*.1;
   4. UPDATE Reservations   
      SET ClassPrice = ClassPrice\*1.01;
9. How would you write the SELECT statement in a longer query if you wanted to concatenate the first and last name of the instructors and display that as InstructorFullName?
   1. SELECT InstructorFirstName, InstructorLastName AS InstructorFullName
   2. SELECT InstructorFirstName & " " & InstructorLastName AS InstructorFullName
   3. SELECT InstructorFirstName AND InstructorLastName AS InstructorFullName
   4. SELECT InstructorFirstName, InstructorLastName SUBSTITUTE InstructorFullName
10. Write the SQL code for the following: Order the reservations by class date and then by class ID. Display all fields.
    1. SELECT \*   
       FROM Reservations   
       ORDER BY ClassDate, ClassID;
    2. DISPLAY ALL FROM Reservations   
       ORDER BY ClassDate, ClassID;
    3. SELECT \*   
       FROM Reservations   
       RANK BY ClassDate, ClassID;
    4. SELECT \*   
       FROM Reservations   
       BY ClassDate, ClassID;

Critical Thinking Questions

1. Pitt Fitness is selling a line of exercise clothing at their three locations. At the beginning of this venture, they decide to sell only three types of t-shirts with the Pitt Fitness logo: two women’s sizes and one men’s size. How would you use SQL to create a new table in the Pitt Fitness database to capture the line of t-shirts and their retail price? This new table would be used for advertising purposes only, so no quantity-on-hand fields are necessary.

Answer: CREATE TABLE Tshirts (TshirtID TEXT(5), TshirtDescription TEXT(25), TshirtPrice CURRENCY);

1. Write an SQL query that would ask the database to count the number of different types of t-shirts available and total their price. Your output should show only the field names: NumberOfTshirts TotalPriceOfTshirts.

Answer: SELECT COUNT (TshirtID) AS NumberOfTshirts, SUM (TshirtPrice) AS TotalPriceOfTshirts FROM Tshirts;.

Sports Physical Therapy Case Exercises

In the following exercises, you will use the data in the Sports Physical Therapy database shown in Figures 1-21 through 1-24 in Chapter 1. Use SQL to answer the questions, either on paper or by running the statements in Access on a copy of the Sports Physical Therapy database.

1. Write the SQL code for the following: List all the information in the patient’s table sorted by city.
   1. SELECT ALL   
      FROM Patients   
      ORDER BY City;
   2. SELECT \*   
      FROM Patients ASC City;
   3. SELECT \*   
      ORDER BY City;
   4. SELECT \*   
      FROM Patient   
      ORDER BY City;
2. Write the SQL code for the following: List the last names of patients whose balance is greater than $1,000.
   1. SELECT LastName, Balance>1000   
      FROM Patient;
   2. SELECT LastName, Balance   
      FROM Patient   
      WHERE Balance>1000;
   3. SELECT LastName, Balance   
      FROM Patient   
      WITH Balance>1000;
   4. SELECT LastName, Balance   
      FROM Patient   
      WHERE Balance<1000;
3. Write the SQL code for the following: List the city, last name, and balance of patients who live in Waterville and have a balance greater than $1,000.
   1. SELECT City, LastName, Balance   
      FROM Patient   
      WHERE 'Waterville' AND >1000;
   2. SELECT City, LastName, Balance   
      WHERE City='Waterville' AND Balance>1000;
   3. SELECT City, LastName, Balance   
      FROM Patient   
      WHERE City="Waterville" AND Balance>1000;
   4. SELECT \*   
      FROM Patient   
      WHERE City='Waterville' AND Balance>1000;
4. Write the SQL code for the following: List the city, last name, and balance of patients who live in Waterville or have a balance greater than $2,000.
   1. SELECT LastName, City, Balance   
      FROM Patient   
      WHERE City='Waterville' AND Balance>2000;
   2. SELECT LastName, City, Balance   
      FROM Patient   
      WHERE City='Waterville' OR Balance>=2000;
   3. SELECT LastName, City, Balance   
      FROM Patient   
      WHERE NOT City='Waterville' OR Balance>2000;
   4. SELECT LastName, City, Balance   
      FROM Patient   
      WHERE City="Waterville" OR Balance>2000;
5. Write the SQL code for the following: Increase the balance by 2% of any patient whose balance is greater than $2,000.
   1. UPDATE Patient   
      SET Balance = Balance\*1.2   
      WHERE Balance>2000;
   2. UPDATE Patient   
      SET Balance = Balance\*1.02   
      WHERE Balance>2000;
   3. UPDATE Patient   
      SET Balance = Balance\*2%   
      WHERE Balance>2000;
   4. SELECT Patient   
      SET Balance = Balance\*1.02   
      WHERE Balance>2000;
6. Write the SQL code for the following: List the session dates and numbers for those sessions scheduled between 10/18/2021 and 10/20/2021.
   1. SELECT SessionDate, SessionNum   
      FROM Session   
      WHERE SessionDate BETWEEN #10/18/2021# AND #10/20/2021#;
   2. SELECT SessionDate, SessionNum   
      FROM Session   
      WHERE SessionDate BETWEEN '10/18/2021' AND '10/20/2021';
   3. SELECT SessionDate, SessionNum   
      WHERE SessionDate BETWEEN #10/18/2021# AND #10/20/2021#;
   4. SELECT SessionDate, SessionNum   
      FROM Session   
      WHERE SessionDate #10/18/2021# >< #10/20/2021#;
7. Write the SQL code for the following: List the full name of the therapist scheduled to work on 10/16/2021.
   1. SELECT Therapist.FirstName, Therapist.LastName   
      FROM Therapist   
      WHERE Therapist.TherapistID = Session.TherapistID AND SessionDate = #10/16/2021#;
   2. SELECT Therapist.FirstName, Therapist.LastName   
      FROM Session   
      WHERE Therapist.TherapistID = Session.TherapistID AND SessionDate = #10/16/2021#;
   3. SELECT Therapist.FirstName, Therapist.LastName   
      FROM Therapist, Session   
      WHERE Therapist.TherapistID = Session.TherapistID;
   4. SELECT Therapist.FirstName, Therapist.LastName   
      FROM Therapist, Session   
      WHERE Therapist.TherapistID = Session.TherapistID AND SessionDate = #10/16/2021#;
8. Write the SQL code that answers the following question: How long are the therapy sessions for the therapist whose last name is Shields? List the length of each session.
   1. SELECT Session.LengthOfSession, Therapist.LastName='Shields'   
      FROM Therapist, Session   
      WHERE Therapist.TherapistID = Session.TherapistID;
   2. SELECT Session.LengthOfSession   
      FROM Therapist, Session   
      WHERE Therapist.LastName='Shields';
   3. SELECT Session.LengthOfSession   
      FROM Therapist, Session   
      WHERE Therapist.TherapistID = Session.TherapistID AND Therapist.LastName='Shields';
   4. SELECT Session.LengthOfSession   
      FROM Session   
      WHERE Therapist.TherapistID = Session.TherapistID AND Therapist.LastName='Shields';
9. Write the SQL code that answers the following question: Which therapies have the word “movement” in their description? List the therapy description only.
   1. SELECT Description   
      FROM Therapies   
      WHERE Description LIKE \*movement\*;
   2. SELECT Description   
      FROM Therapies   
      WHERE Description LIKE "\*movement\*";
   3. SELECT Description   
      FROM Therapies   
      WHERE Description LIKE 'movement';
   4. SELECT Description   
      FROM Therapies   
      WHERE Description IS '\*movement\*';
10. Write the SQL code that answers the following question: How many therapies are offered? Answer with one number only.
    1. SELECT COUNT(TherapyCode) AS CountOfTherapyCode   
       FROM Therapies;
    2. SELECT COUNT ALL AS CountOfTherapyCode   
       FROM Therapies;
    3. SELECT COUNT(TherapyCode) AS "CountOfTherapyCode"   
       FROM Therapies;
    4. SELECT COUNT(TherapyCode) AS CountOfTherapyCode;

Critical Thinking Questions

1. Write an SQL query that displays the therapies and their unit of time for the therapies that include the word bath, hot, or electrical.

Answer: SELECT TherapyCode, Description, UnitOfTime FROM Therapies WHERE Description LIKE "\*bath\*" OR Description LIKE "\*hot\*" OR Description LIKE "\*electrical\*";

Alternative (better) answer: SELECT \* FROM Therapies WHERE Description LIKE "\*bath\*" OR Description LIKE "\*hot\*" OR Description LIKE "\*electrical\*";

1. Write an SQL query to display every therapist’s first name and last name as their full name, but only for those instructors not living in zip code 72511.

Answer: SELECT FirstName &" "& LastName AS FullName FROM Therapist WHERE NOT ZipCode=72511;