

## Database Programming with SQL

### 1-3: Anatomy of a SQL Statement

### Practice Activities

#### Objectives

- Match projection, selection, and join with their correct functions capabilities
- Create a basic SELECT statement
- Use the correct syntax to display all rows in a table
- Use the correct syntax to select specific columns in a table, modify the way data is displayed, and perform calculations using arithmetic expressions and operators
- Formulate queries using correct operator precedence to display desired results
- Define a null value
- Demonstrate the effect null values create in arithmetic expressions
- Construct a query using a column alias

#### Vocabulary

Identify the vocabulary word for each definition below.

Join	Display data from two or more related tables.
Arithmetic operator	A symbol used to perform an operation on some values.
Column	An implementation of an attribute or relationship in a table.
Projection	The capability in SQL to choose the columns in a table that you want returned from a query.
NULL	A value that is unavailable, unassigned, unknown, or inapplicable.
Alias	Renames a column heading.
Arithmetic expression	A mathematical equation.
Selection	The capability in SQL to choose the rows in a table returned from a query.
SELECT statement	Retrieves information from the database
SELECT clause	Specifies the columns to be displayed
FROM clause	Specifies the table containing the column listed in the select clause
Keyword	An individual SQL command

Clause	Part of a SQL statement
Statement	A combination of the two clauses

## Try It / Solve It

Now you know the basics of a SELECT statement, It's time to practice what you've learned.

1. Write a SQL statement that demonstrates projection.

```
SELECT first_name, last_name
FROM employees;
```

2. Write a query that displays the last\_name and email addresses for all the people in the DJs on Demand d\_client table. The column headings should appear as "Client" and "Email Address."

```
SELECT last_name AS "Client", email AS "Email Address"
FROM d_client;
```

3. The manager of Global Fast Foods decided to give all employees at 5%/hour raise + a \$.50 bonus/hour. However, when he looked at the results, he couldn't figure out why the new raises were not as he predicted. Ms. Doe should have a new salary of \$7.59, Mr. Miller's salary should be \$11.00, and Monique Tuttle should be \$63.50. He used the following query. What should he have done?

```
SELECT last_name, salary *.05 +.50
FROM f_staffs;

SELECT last_name, salary * 1.05 + 0.50
FROM f_staffs;
```

4. Which of the following would be the easiest way to see all rows in the d\_songs table?
  - a. SELECT id, title, duration, artist, type\_code
  - b. SELECT columns
  - c. **SELECT \***
  - d. SELECT all
5. If  $\text{tax} = 8.5\% * \text{car\_cost}$  and  $\text{license} = \text{car\_cost} * .01\%$ , which value will produce the largest car payment?
  - a. **Payment = (car\_cost \* 1.25) + 5.00 - (tax) - (license)**
  - b. Payment = car\_cost \* 1.25 + 5.00 - (tax - license)

6. In the example below, identify the keywords, the clause(s), and the statement(s):

```
SELECT employee_id, last_name
FROM employees
```

Keywords: SELECT, FROM

Clauses: SELECT employee\_id, last\_name, FROM employees

Statement: SELECT employee\_id, last\_name FROM employees

7. Label each example as SELECTION or PROJECTION.
  - a. Please give me Mary Adam's email address. **SELECTION**
  - b. I would like only the manager\_id column, and none of the other columns. **PROJECTION**

8. Which of the following statements are true?

- a.  $\text{null} * 25 = 0$ ;
- b.  $\text{null} * 6.00 = 6.00$
- c.  $\text{null} * .05 = \text{null}$
- d.  $(\text{null} + 1.00) + 5.00 = 5.00$

9. How will the column headings be labeled in the following example?

```
SELECT bear_id bears, color AS Color, age "age"  
FROM animals;
```

- a. bears, color, age
- b. BEARS, COLOR, AGE
- c. BEARS, COLOR, age
- d. Bears, Color, Age

10. Which of the following words must be in a SELECT statement in order to return all rows?

- a. SELECT only
- b. SELECT and FROM
- c. FROM only
- d. SELECT \* only

## Database Programming with SQL

### 2-1: Working with Columns, Characters, and Rows

#### Practice Activities

##### Objectives

- Apply the concatenation operator to link columns to other columns, arithmetic expressions, or constant values to create a character expression
- Use Column Aliases to rename columns in the query result
- Enter literal values of type character, number, or date into a SELECT statement
- Define and use DISTINCT to eliminate duplicate rows
- Display the structure of a table using DESCRIBE or DESC
- Edit, execute, and save SQL statements in Oracle Application Express

##### Vocabulary

Identify the vocabulary word for each definition below.

DISTINCT	A command that suppresses duplicates
Concatenation operator	Links two columns together to form one character data column
String	A group of character data
DESCRIBE (DESC)	An SQL plus command that displays the structure of a table

##### Try It / Solve It

1. The manager of Global Fast Foods would like to send out coupons for the upcoming sale. He wants to send one coupon to each household. Create the SELECT statement that returns the customer last name and a mailing address.

```
SELECT last_name, address  
FROM customers;
```

2. Each statement below has errors. Correct the errors and execute the query in Oracle Application Express.

- a.
- |                   |                   |
|-------------------|-------------------|
| SELECT first name | SELECT first_name |
| FROM f_staffs;    | FROM f_staffs;    |
- b.
- |  |  |
|--|--|
| SELECT first_name    " "    last_name AS "DJs on Demand Clients" |  |
| FROM d_clients;  | SELECT first_name    ' '    last_name AS "DJs on Demand Clients" |
|  | FROM d_clients;  |
- c.
- |                                |                               |
|--------------------------------|-------------------------------|
| SELECT DISCTINCT f_order_lines | SELECT DISTINCT f_order_lines |
| FROM quantity;                 | FROM quantity;                |
- d.
- |                     |                     |
|---------------------|---------------------|
| SELECT order number | SELECT order_number |
| FROM f_orders;      | FROM f_orders;      |

3. Sue, Bob, and Monique were the employees of the month. Using the f\_staffs table, create a SELECT statement to display the results as shown in the Super Star chart.

Super Star
*** Sue *** Sue ***
*** Bob *** Bob ***
*** Monique *** Monique ***

```
SELECT '*** ' || first_name || ' *** ' || first_name || ' ***' AS "Super Star"
FROM f_staffs
WHERE first_name IN ('Sue', 'Bob', 'Monique');
```

4. Which of the following is TRUE about the following query?

```
SELECT first_name, DISTINCT birthdate
FROM f_staffs;
```

- a. Only two rows will be returned.
- b. Four rows will be returned.
- c. Only Fred 05-Jan-1988 and Lizzie 10-Nov-1987 will be returned.
- d. **No rows will be returned.**

5. Global Fast Foods has decided to give all staff members a 5% raise. Prepare a report that presents the output as shown in the chart.

EMPLOYEE LAST NAME	CURRENT SALARY	SALARY WITH 5% RAISE

```
SELECT last_name AS "EMPLOYEE LAST NAME", salary AS "CURRENT SALARY", salary * 1.05 AS "SALARY WITH 5% RAISE"
FROM f_staffs;
```

6. Create a query that will return the structure of the Oracle database EMPLOYEES table. Which columns are marked “nullable”? What does this mean? `DESC employees;`

Nullable Columns:  
 FIRST\_NAME, PHONE\_NUMBER, SALARY,  
 COMMISSION\_PCT, MANAGER\_ID, DEPARTMENT\_ID,  
 BONUS

The columns marked nullable allow null values, meaning they can be left empty when inserting data

7. The owners of DJs on Demand would like a report of all items in their D\_CDs table with the following column headings: Inventory Item, CD Title, Music Producer, and Year Purchased. Prepare this report.
- ```
SELECT item AS "Inventory Item", title AS "CD Title", producer AS "Music Producer",
       year_purchased AS "Year Purchased"
FROM d_cds;
```
8. **True**/False -- The following SELECT statement executes successfully:  
 SELECT last\_name, job\_id, salary AS Sal  
 FROM employees;
9. **True**/False -- The following SELECT statement executes successfully:  
 SELECT \*  
 FROM job\_grades;
10. There are four coding errors in this statement. Can you identify them?
- |                               |                                |                                                                                                                              |
|-------------------------------|--------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| SELECT employee_id, last_name | SELECT employee_id, last_name, | 1. Missing comma after last_name in the SELECT clause.                                                                       |
| sal x 12 ANNUAL SALARY        | salary * 12 AS "ANNUAL SALARY" | 2. x should be * for multiplication.                                                                                         |
| FROM employees;               | FROM employees;                | 3. sal should be salary (correct column name).                                                                               |
|                               |                                | 4. The alias for the calculated field should be formatted using AS and quotes if it includes spaces. Use AS "ANNUAL SALARY". |
11. In the arithmetic expression salary\*12 - 400, which operation will be evaluated first?  
**Multiplication**
12. Which of the following can be used in the SELECT statement to return all columns of data in the Global Fast Foods f\_staffs table?
- column names
  - \***
  - DISTINCT id
  - both a and b
13. Using SQL to choose the columns in a table uses which capability?
- selection
  - projection**
  - partitioning
  - join
14. SELECT last\_name AS "Employee". The column heading in the query result will appear as:
- EMPLOYEE
  - employee
  - Employee**
  - "Employee:"

15. Which expression below will produce the largest value?
- a. SELECT salary\*6 + 100
  - b. **SELECT salary\* (6 + 100)**
  - c. SELECT 6(salary+ 100)
  - d. SELECT salary+6\*100
16. Which statement below will return a list of employees in the following format?  
Mr./Ms. Steven King is an employee of our company.
- a. SELECT "Mr./Ms."||first\_name||' '||last\_name 'is an employee of our company.' AS "Employees"  
FROM employees;
  - b. SELECT 'Mr./Ms. 'first\_name,last\_name ||' '||'is an employee of our company.' FROM employees;
  - c. **SELECT 'Mr./Ms. '||first\_name||' '||last\_name ||' '||'is an employee of our company.' AS "Employees"**  
FROM employees ;
  - d. SELECT Mr./Ms. ||first\_name||' '||last\_name ||' '||'is an employee of our company." AS "Employees"  
FROM employees
17. Which is true about SQL statements?
- a. SQL statements are case-sensitive
  - b. SQL clauses should not be written on separate lines.
  - c. **Keywords cannot be abbreviated or split across lines.**
  - d. SQL keywords are typically entered in lowercase; all other words in uppercase.
18. Which queries will return three columns each with UPPERCASE column headings?
- a. SELECT "Department\_id", "Last\_name", "First\_name"  
FROM employees;
  - b. **SELECT DEPARTMENT\_ID, LAST\_NAME, FIRST\_NAME  
FROM employees;**
  - c. SELECT department\_id, last\_name, first\_name AS UPPER CASE  
FROM employees
  - d. SELECT department\_id, last\_name, first\_name  
FROM employees;
19. Which statement below will likely fail?
- a. **SELECT \* FROM employees;**
  - b. Select \* FROM employees;
  - c. SELECT \* FROM EMPLOYEES;
  - d. Select\* FROM employees;

20. Click on the History link at the bottom of the SQL Commands window. Scroll or use the arrows at the bottom of the page to find the statement you wrote to solve problem 3 above. (The one with the column heading SuperStar). Click on the statement to load it back into the command window. Execute the command again, just to make sure it is the correct one that works. Once you know it works, click on the SAVE button in the top right corner of the SQL Commands window, and enter a name for your saved statement. Use your own initials and “\_superstar.sql”, so if your initials are CT then the filename will be CT\_superstar.sql.

Log out of OAE, and log in again immediately. Navigate back to the SQL Commands window, click the Saved SQL link at the bottom of the page and load your saved SQL statement into the Edit window. This is done by clicking on the script name. Edit the statement, to make it display + instead of \*. Run your amended statement and save it as initials\_superplus.sql.

The screenshot shows the APEX SQL Workshop interface. The top navigation bar includes 'APEX', 'App Builder', 'SQL Workshop', 'Team Development', and 'Gallery'. The 'SQL Commands' window is active, showing a query: 

```
1 SELECT '+++ ' || first_name || ' +++ ' || first_name || ' +++' AS "Super Star"
2 FROM f_staffs
3 WHERE first_name IN ('Sue', 'Bob', 'Monique');
```

 The 'Save' button is highlighted. Below the command window, the 'Saved SQL' tab is selected, displaying a table with saved queries.

| Owner      | Name             | Description | SQL                                                                                                                                         | Updated By | Updated         |
|------------|------------------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------------|
| USA_DEMO_1 | KB_superplus.sql | -           | SELECT '+++ '    first_name    ' +++ '    first_name    ' +++' AS "Super Star" FROM f_staffs WHERE first_name IN ('Sue', 'Bob', 'Monique'); | USA_DEMO_1 | Now             |
| USA_DEMO_1 | KB_superstar.sql | -           | SELECT '*** '    first_name    ' *** '    first_name    ' ***' AS "Super Star" FROM f_staffs WHERE first_name IN ('Sue', 'Bob', 'Monique'); | USA_DEMO_1 | 110 seconds ago |

The screenshot shows the APEX SQL Workshop interface with the 'Results' window selected. The query from the 'Super Star' script is executed, resulting in the following output:

| Super Star                  |
|-----------------------------|
| +++ Sue +++ Sue +++         |
| +++ Bob +++ Bob +++         |
| +++ Monique +++ Monique +++ |

3 rows returned in 0.01 seconds



## Database Programming with SQL

### 2-2: Limit Rows Selected

#### Practice Activities

##### Objectives

- Apply SQL syntax to restrict the rows returned from a query
- Demonstrate application of the WHERE clause syntax
- Explain why it is important, from a business perspective, to be able to easily limit data retrieved from a table
- Construct and produce output using a SQL query containing character strings and date values

##### Vocabulary

Identify the vocabulary word for each definition below.

|                     |                                                        |
|---------------------|--------------------------------------------------------|
| WHERE Clause        | Restricts the rows returned by a select statement      |
| Comparison Operator | Compares one expression to another value or expression |

##### Try It / Solve It

1. Using the Global Fast Foods database, retrieve the customer's first name, last name, and address for the customer who uses ID 456.

```
FIRST_NAME | LAST_NAME | ADDRESS
Zoe         Twee         1009 Oliver Avenue
```

2. Show the name, start date, and end date for Global Fast Foods' promotional item "ballpen and highlighter" giveaway.

```
SELECT name, start_date, end_date
FROM F_PROMOTIONAL_MENUS
WHERE give_away = 'ballpen and highlighter';
```

| NAME           | START_DATE | END_DATE   |
|----------------|------------|------------|
| Back to School | 09/01/2004 | 09/30/2004 |

3. Create a SQL statement that produces the following output:

|                                                                      |
|----------------------------------------------------------------------|
| Oldest                                                               |
| The 1997 recording in our database is The Celebrants Live in Concert |

```
SELECT 'The 1997 recording in our database is ' || title AS "Oldest"
FROM d_cds
WHERE year = 1997;
```

4. The following query was supposed to return the CD title "Carpe Diem" but no rows were returned. Correct the mistake in the statement and show the output.

```
SELECT produce, title
FROM d_cds
WHERE title = 'carpe diem' ;
```

```
SELECT producer, title
FROM d_cds
WHERE title = 'Carpe Diem';
```

5. The manager of DJs on Demand would like a report of all the CD titles and years of CDs that were produced before 2000.

|                    | TITLE                          | YEAR |
|--------------------|--------------------------------|------|
| SELECT title, year | The Celebrants Live in Concert | 1997 |
| FROM d_cds         | Songs from My Childhood        | 1999 |
| WHERE year < 2000; | Graduation Songbook            | 1998 |

6. Which values will be selected in the following query?

```
SELECT salary
FROM employees
WHERE salary <= 5000;
```

- a. 5000
- b. 0 - 4999
- c. 2500
- d. 5

**For the next three questions, use the following table information:**

TABLE NAME: students

COLUMNS:

studentno NUMBER(6)

fname VARCHAR2(12)

lname VARCHAR(20)

sex CHAR(1)

major VARCHAR2(24)

The SQL and PLSQL scripts provided are not creating the 'sex' or 'major' columns needed to appropriately run these queries.

7. Write a SQL statement that will display the student number (studentno), first name (fname), and last name (lname) for all students who are female (F) in the table named students.

```
SELECT studentno, fname, lname
FROM students
WHERE sex = 'F';
```

8. Write a SQL statement that will display the student number (studentno) of any student who has a PE major in the table named students. Title the studentno column Student Number.

```
SELECT studentno AS "Student Number"
FROM students
WHERE major = 'PE';
```

9. Write a SQL statement that lists all information about all male students in the table named students.

```
SELECT *
FROM students
WHERE sex = 'M';
```

10. Write a SQL statement that will list the titles and years of all the DJs on Demand CDs that were not produced in 2000.

```
SELECT title, year
FROM d_cds
WHERE year != 2000;
```

11. Write a SQL statement that lists the Global Fast Foods employees who were born before 1980.

|                                                          | FIRST_NAME | LAST_NAME | BIRTHDATE  |
|----------------------------------------------------------|------------|-----------|------------|
| SELECT first_name, last_name, birthdate                  | Bob        | Miller    | 03/19/1979 |
| FROM F_STAFFS                                            | Monique    | Tuttle    | 03/30/1969 |
| WHERE birthdate < TO_DATE('01-JAN-1980', 'DD-MON-YYYY'); |            |           |            |

## Database Programming with SQL

### 2-3: Comparison Operators

#### Practice Activities

##### Objectives

- Apply the proper comparison operator to return a desired result
- Demonstrate proper use of BETWEEN, IN, and LIKE conditions to return a desired result
- Distinguish between zero and the value of NULL as unavailable, unassigned, unknown, or inapplicable
- Explain the use of comparison conditions and NULL

##### Vocabulary

Identify the vocabulary word for each definition below.

|               |                                                                                       |
|---------------|---------------------------------------------------------------------------------------|
| ESCAPE        | This option identifies that the escape characters should be interpreted literally     |
| IS NULL       | Condition tests for null values                                                       |
| BETWEEN...AND | Displays rows based on a range of values                                              |
| Inclusive     | Including the specified limits and the area between them; the numbers 1-10, inclusive |
| LIKE          | Selects rows that match a character pattern                                           |
| IN            | Tests for values in a specified list of values                                        |

##### Try It / Solve It

1. Display the first name, last name, and salary of all Global Fast Foods staff whose salary is between \$5.00 and \$10.00 per hour.

```
SELECT first_name, last_name, salary
FROM f_staffs
WHERE salary BETWEEN 5.00 AND 10.00;
```

| FIRST_NAME | LAST_NAME | SALARY |
|------------|-----------|--------|
| Sue        | Doe       | 6.75   |
| Bob        | Miller    | 10     |

2. Display the location type and comments for all DJs on Demand venues that are Private Home.

```
SELECT loc_type location_type, comments
FROM d_venues
WHERE loc_type = 'Private Home';
```

| LOCATION_TYPE | COMMENTS                                  |
|---------------|-------------------------------------------|
| Private Home  | Large kitchen, spacious lawn              |
| Private Home  | 3 level townhouse, speakers on all floors |
| Private Home  | Gazebo, multi-level deck                  |

3. Using only the less than, equal, or greater than operators, rewrite the following query:

```
SELECT first_name, last_name
FROM f_staffs
WHERE salary BETWEEN 20.00 and 60.00;
```

```
SELECT first_name, last_name
FROM f_staffs
WHERE salary >= 20.00 AND salary <= 60.00;
```

4. Create a list of all the DJs on Demand CD titles that have "a" as the second letter in the title.

```
SELECT title
FROM d_cds
WHERE title LIKE '_a%';
```

| TITLE                         |
|-------------------------------|
| Back to the Shire             |
| Carpe Diem                    |
| Party Music for All Occasions |

5. Who are the partners of DJs on Demand who do not get an authorized expense amount?

|                                                                                         | <b>FIRST_NAME</b> | <b>LAST_NAME</b> |
|-----------------------------------------------------------------------------------------|-------------------|------------------|
| <pre>SELECT first_name, last_name FROM d_partners WHERE auth_expense_amt IS NULL;</pre> | Jennifer          | cho              |
|                                                                                         | Jason             | Tsang            |

6. Select all the Oracle database employees whose last names end with “s”. Change the heading of the column to read Possible Candidates.

|                                                                                                | <b>Possible Candidates</b> |
|------------------------------------------------------------------------------------------------|----------------------------|
| <pre>SELECT last_name AS "Possible Candidates" FROM employees WHERE last_name LIKE '%s';</pre> | Davies                     |
|                                                                                                | Higgins                    |
|                                                                                                | Loermans                   |
|                                                                                                | Matos                      |
|                                                                                                | Mourgos                    |
|                                                                                                | Rajs                       |
|                                                                                                | Stocks                     |
|                                                                                                | Vargas                     |

7. Which statement(s) are valid?

- a. WHERE quantity <> NULL;
- b. WHERE quantity = NULL;
- c. **WHERE quantity IS NULL;**
- d. WHERE quantity != NULL;

8. Write a SQL statement that lists the songs in the DJs on Demand inventory that are type code 77, 12, or 1.

|                                                                                 | <b>SONG_TITLE</b>           |
|---------------------------------------------------------------------------------|-----------------------------|
| <pre>SELECT title song_title FROM d_songs WHERE type_code IN (77, 12, 1);</pre> | Its Finally Over            |
|                                                                                 | Im Going to Miss My Teacher |
|                                                                                 | Hurrah for Today            |
|                                                                                 | Meet Me At the Altar        |
|                                                                                 | Lets Celebrate              |

## Database Programming with SQL

### 3-1: Logical Comparisons and Precedence Rules

#### Practice Activities

#### Objectives

- Evaluate logical comparisons to restrict the rows returned based on two or more conditions
- Apply the rules of precedence to determine the order in which expressions are evaluated and calculated

#### Vocabulary

Identify the vocabulary word for each definition below.

|                  |                                                                                  |
|------------------|----------------------------------------------------------------------------------|
| NOT              | Inverts the value of the condition                                               |
| AND              | Both conditions must be true for a record to be selected                         |
| Precedence Rules | Rules that determine the order in which expressions are evaluated and calculated |
| OR               | Either condition can be true for a record to be selected                         |

#### Try It / Solve It

- Execute the two queries below. Why do these nearly identical statements produce two different results? Name the difference and explain why.
 

```
SELECT code, description
FROM d_themes
WHERE code >200 AND description IN('Tropical', 'Football', 'Carnival');

SELECT code, description
FROM d_themes
WHERE code >200 OR description IN('Tropical', 'Football', 'Carnival');
```

The difference is that the first query uses AND, which requires both conditions (code > 200 and description IN('Tropical', 'Football', 'Carnival')) to be true. The second query uses OR, which means either one of the conditions can be true for a record to be selected, leading to more results.

The first query returns records where the code is greater than 200 and the description is one of the specified values. The second query returns all records where either the code is greater than 200 or the description matches one of the specified values.
- Display the last names of all Global Fast Foods employees who have “e” and “i” in their last names.
 

```
SELECT last_name
FROM f_staffs
WHERE last_name LIKE '%e%' AND last_name LIKE '%i%';
```

**LAST\_NAME**  
Miller
- I need to know who the Global Fast Foods employees are that make more than \$6.50/hour and their position is not order taker.
 

```
SELECT first_name, last_name, staff_type, salary
FROM f_staffs
WHERE salary > 6.50 AND staff_type != 'Order Taker';
```

| FIRST_NAME | LAST_NAME | STAFF_TYPE | SALARY |
|------------|-----------|------------|--------|
| Bob        | Miller    | Cook       | 10     |
| Monique    | Tuttle    | Manager    | 60     |
- Using the employees table, write a query to display all employees whose last names start with “D” and have “a” and “e” anywhere in their last name.
 

```
SELECT first_name, last_name
FROM employees
WHERE last_name LIKE 'D%'
AND last_name LIKE '%a%'
AND last_name LIKE '%e%';
```

| FIRST_NAME | LAST_NAME |
|------------|-----------|
| Curtis     | Davies    |
| Lex        | De Haan   |

5. In which venues did DJs on Demand have events that were not in private homes?

|                                                                                                   |                                                          |                                                                                                                                       |
|---------------------------------------------------------------------------------------------------|----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| <pre>SELECT loc_type location_type, address FROM d_venues WHERE loc_type != 'Private Home';</pre> | <pre>LOCATION_TYPE School Hall National Park Hotel</pre> | <pre>ADDRESS 4 Mahogany Drive, Boston, MA 10010 87 Park Avenue, San Diego, CA 28978 200 Pennsylvania Ave, Washington D.C. 09002</pre> |
|---------------------------------------------------------------------------------------------------|----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|

6. Which list of operators is in the correct order from highest precedence to lowest precedence?

- a. AND, NOT, OR
- b. NOT, OR, AND
- c. **NOT, AND, OR**

**For questions 7 and 8, write SQL statements that will produce the desired output.**

7. Who am I?

I was hired by Oracle after May 1998 but before June of 1999. My salary is less than \$8000 per month, and I have an “en” in my last name.

```
SELECT first_name, last_name, hire_date
FROM employees
WHERE hire_date BETWEEN '05/01/1998' AND '06/01/1999'
AND salary < 8000
AND last_name LIKE '%en%';
```

8. What's my email address?

Because I have been working for Oracle since the beginning of 1996, I make more than \$9000 per month. Because I make so much money, I don't get a commission.

```
SELECT first_name, last_name, email
FROM employees
WHERE hire_date >= '01/01/1996'
AND salary > 9000
AND commission_pct IS NULL;
```

## Database Programming with SQL

### 3-2: Sorting Rows

#### Practice Activities

##### Objectives

- Construct a query to sort a result set in ascending or descending order
- State the order in which expressions are evaluated and calculated based on the rules of precedence
- Construct a query to order a result set using a column alias
- Construct a query to order a result set for single or multiple columns

##### Vocabulary

Identify the vocabulary word for each definition below.

|            |                                                             |
|------------|-------------------------------------------------------------|
| ASCENDING  | Orders the rows in ascending order (the default order); A-Z |
| DESCENDING | Orders the rows in descending order: Z-A                    |
| Sorting    | To arrange according to class, kind, or size                |

##### Try It / Solve It

1. In the example below, assign the employee\_id column the alias of "Number." Complete the SQL statement to order the result set by the column alias.

|                                                                      |                                                                                                    |
|----------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| <pre>SELECT employee_id, first_name, last_name FROM employees;</pre> | <pre>SELECT employee_id AS "Number", first_name, last_name FROM employees ORDER BY "Number";</pre> |
|----------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|

2. Create a query that will return all the DJs on Demand CD titles ordered by year with titles in alphabetical order by year.

```
SELECT year, title
FROM d_cds
ORDER BY year, title;
```

3. Order the DJs on Demand songs by descending title. Use the alias "Our Collection" for the song title.

|                                                                                          |                                                                                                                                             |
|------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| <pre>SELECT title AS "Our Collection" FROM d_songs ORDER BY "Our Collection" DESC;</pre> | <pre>Our Collection Meet Me At the Altar Lets Celebrate Its Finally Over Im Going to Miss My Teacher Hurrah for Today All These Years</pre> |
|------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|

4. Write a SQL statement using the ORDER BY clause that could retrieve the information needed. Do not run the query.

Create a list of students who are in their first year of school. Include the first name, last name, student ID number, and parking place number. Sort the results alphabetically by student last name and then by first name. If more than one student has the same last name, sort each first name in Z to A order. All other results should be in alphabetical order (A to Z).

```
SELECT first_name, last_name, stu_id, parking_num
FROM students
WHERE year = 1
ORDER BY last_name ASC, first_name DESC;
```

5. Write a SQL statement using the employees table and the ORDER BY clause that could retrieve the information in the following table. Return only those employees with employee\_id < 125.

| DEPARTMENT_ID | LAST_NAME | MANAGER_ID |
|---------------|-----------|------------|
| 90            | Kochhar   | 100        |
| 90            | King      | (null)     |
| 90            | De Haan   | 100        |
| 60            | Lorentz   | 103        |
| 60            | Hunold    | 102        |
| 60            | Ernst     | 103        |
| 50            | Mourgos   | 100        |

```
SELECT department_id, last_name, manager_id
FROM employees
WHERE employee_id < 125
ORDER BY department_id, last_name, manager_id;
```

### Extension Activities

- Limiting values with the WHERE clause is an example of:
  - Projection
  - Ordering
  - Joining
  - Grouping
  - Selection**
- You want to sort your CD collection by title, and then by artist. This can be accomplished using:
  - WHERE
  - SELECT
  - ORDER BY**
  - DISTINCT



3. Which of the following are SQL keywords?
- SELECT**
  - ALIAS
  - COLUMN
  - FROM**
4. Which of the following are true?
- Multiplication and division take priority over addition.**
  - Operators of the same priority are evaluated from left to right.**
  - Parentheses can be used to override the rules of precedence.**
  - None of the above are true.
5. The following query was written:
- ```
SELECT DISTINCT last_name  
FROM students
```
- To select all the outstanding students
  - To choose last names that are duplicates
  - To select last names without duplicates**
  - To select all last names
6. The following string was created using which SELECT clause?
- Abby Rogers is an order taker for Global Fast Foods
- SELECT first\_name || ' ' || last\_name || ' is an ' staff\_type ' for Global Fast Foods'
  - SELECT Abby Rogers is an ||staff\_type||' for Global Fast Foods'
  - SELECT first\_name,last\_name '||staff\_type||' for Global Fast Foods'
  - SELECT first\_name || ' ' || last\_name || ' is an '||staff\_type||' for Global Fast Foods'**
7. Which of the following SELECT clauses will return uppercase column headings?
- SELECT id, last\_name, address, city, state, zip, phone\_number;
  - SELECT ID, LAST\_NAME, ADDRESS, CITY, STATE, ZIP, PHONE\_NUMBER;**
  - SELECT Id, Last\_name, Address, City, State, Zip, Phone\_number;
  - SELECT id AS ID, last\_name AS NAME, address AS ADDRESS, city AS CITY, state AS STATE, zip AS ZIP, phone\_number AS PHONE\_NUMBER;
8. Which SELECT statement will **always** return the last names in alphabetical order?
- SELECT last\_name AS ORDER BY FROM employees
  - SELECT last\_name FROM employees ORDER BY last\_name**
  - SELECT last\_name FROM employees
  - SELECT ASC last\_name FROM employees
9. Which SELECT clause will return a column heading for employee\_id called "New Employees"?
- SELECT last\_name AS "New Employees"
  - SELECT employee\_id AS New Employees
  - SELECT employee AS "New Employees"**

d. **SELECT employee\_id AS "New Employees"**

10. Examine the following query:

```
SELECT last_name, job_id, salary
FROM employees
WHERE job_id = 'SA_REP' OR job_id = 'AD_PRES' AND salary >15000;
```

Which results could not have been returned from this query?

- a. Joe Everyone, sales representative, salary 15000
- b. **Jane Hendricks, sales manager, salary 15500**
- c. Arnie Smithers, administration president, 20000
- d. Jordan Lim, sales representative, salary 14000

11. Finish this query so it returns all employees whose last names start with

```
“St”. SELECT last_name
FROM employees
SELECT last_name
FROM employees
WHERE last_name LIKE 'St%';
```

12. What salary values will not be returned from this query?

```
SELECT last_name, first_name, salary
FROM employees
WHERE salary BETWEEN 1900 AND 2100;
```

The query excludes salaries outside the range of 1900 and 2100, so any value below 1900 or above 2100 will not be returned.

13. Correct each WHERE clause:

- |  |  |
|--|--|
| a. WHERE department_id NOT IN 101,102,103; | a. WHERE department_id NOT IN (101, 102, 103); |
| b. WHERE last_name = King                  | b. WHERE last_name = 'King';                   |
| c. WHERE start date LIKE "05-May-1998"     | c. WHERE start_date LIKE '05-May-1998';        |
| d. WHERE salary IS BETWEEN 5000 AND 7000   | d. WHERE salary BETWEEN 5000 AND 7000;         |
| e. WHERE id != 10                          | e. WHERE id != 10;                             |

14. SELECT prefix  
FROM phone  
WHERE prefix BETWEEN 360 AND 425  
OR prefix IN (206,253,625)  
AND prefix BETWEEN 315 AND 620;

Which of the following values could be returned?  
625, 902, 410, 499

## Database Programming with SQL

### 3-3: Introduction to Functions

#### Practice Activities

##### Objectives

- Identify appropriate applications of single-row functions in query statements
- Classify a function as a single-row or multi-row function
- Differentiate between single-row functions and multirow functions and the result returned by each

##### Try It / Solve It

1. For each task, choose whether a single-row or multiple row function would be most appropriate:

- Showing all of the email addresses in upper case letters **Single-row | UPPER**
- Determining the average salary for the employees in the sales department **Multiple-row | AVG**
- Showing hire dates with the month spelled out (*September 1, 2004*) **Single-row | TO\_CHAR**
- Finding out the employees in each department that had the most seniority (the earliest hire date) **Multiple-row | MIN**
- Displaying the employees' salaries rounded to the hundreds place **Single-row | ROUND**
- Substituting zeros for null values when displaying employee commissions. **Single-row | NVL**

2. The most common multiple-row functions are: AVG, COUNT, MAX, MIN, and SUM. Give your own definition for each of these functions.

AVG: This function returns the average value of a column (e.g., calculating the average salary of employees).  
 COUNT: This function counts the number of rows that match the query criteria (e.g., the number of employees in a department).  
 MAX: This function returns the maximum value in a column (e.g., finding the highest salary among employees).  
 MIN: This function returns the minimum value in a column (e.g., finding the earliest hire date).  
 SUM: This function adds up all values in a column (e.g., summing up all salaries in a department).

3. Test your definitions by substituting each of the multiple-row functions into this query.

SELECT FUNCTION(salary)	SELECT AVG(salary)	<b>AVG (SALARY)</b>
	FROM employees;	7355
FROM employees	SELECT COUNT(salary)	<b>COUNT (SALARY)</b>
	FROM employees;	40
Write out each query and its results.	SELECT MAX(salary)	<b>MAX (SALARY)</b>
	FROM employees;	24000
	SELECT MIN(salary)	<b>MIN (SALARY)</b>
	FROM employees;	2500
	SELECT SUM(salary)	<b>SUM (SALARY)</b>
	FROM employees;	294200