**Programming 2, 3**

**Database Programming with SQL  
1-3: Anatomy of a SQL Statement  
Practice Activities**

Vocabulary  
Identify the vocabulary word for each definition below.

|  |  |
| --- | --- |
| **Join** | Display data from two or more related tables. |
| **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. |
| **Expression** | A mathematical equation. |
| **Selection** | The capability in SQL to choose the rows in a table returned from a query. |
| **Select** | 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 |
| **Statement** | An individual SQL command |
| **Clause** | Part of a SQL statement |
| **Select and From clause** | A combination of the two clauses |

1. Write a SQL statement that demonstrates projection.

* SELECT first\_name, last\_name FROM employees;

1. 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;

1. 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;

* The issue with this query is in the order of operations. SQL evaluates multiplication before addition. The manager must ensure that the 5% salary increase is applied first before adding the $0.50 bonus.

**Corrected query:** SELECT last\_name, (salary \* 1.05) + 0.50 FROM f\_staffs;

1. 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

* **Ans:** SELECT \*

1. If tax = 8.5% \* car\_cost and license = 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)

* **Ans:** a. Payment = (car\_cost \* 1.25) + 5.00 - (tax) - (license)

1. 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: The whole line is an SQL **statement**.

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

* A. **Selection:** retrieving specific data for Mary Adams
* B. **Projection:** retrieving only one column, manager\_id

1. Which of the following statements are true?  
   a. null \* 25 = 0;  
   b. null \* 6.00 = 6.00  
   c. null \* .05 = null  
   d. (null + 1.00) + 5.00 = 5.00

* **Ans:** c. null \* .05 = null (In SQL, any operation with **null** results in **null**).

1. 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

* **Ans:** c. BEARS, COLOR, age

The correct choice is c. BEARS, COLOR, age, because:

* bear\_id is aliased to BEARS (uppercase due to SQL's default)
* color is aliased to COLOR (uppercase unless specifically modified)
* age remains lowercase because it's enclosed in double quotes, "age".

1. 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

* **Ans:** b. SELECT and FROM

**Database Programming with SQL  
2-1: Working with Columns, Characters, and Rows  
Practice Activities**

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 |

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;

1. Each statement below has errors. Correct the errors and execute the query in Oracle Application Express.  
   a.  
   SELECT first name  
   FROM f\_staffs;

* SELECT first\_name

FROM f\_staffs;

* Correction: Add an underscore in first\_name.

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;

* Correction: Use the || operator for concatenation, and correct the syntax for column alias.

c.  
SELECT DISCTINCT f\_order\_lines  
FROM quantity;

* SELECT DISTINCT f\_order\_lines

FROM quantity;

* Correction: Correct the typo DISCTINCT to DISTINCT.

d.  
SELECT order number  
FROM f\_orders;

* SELECT order\_number

FROM f\_orders;

* Correction: Use the correct column name order\_number.

1. 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');

1. 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.

* **Ans:** d. No rows will be returned.  
  Explanation: DISTINCT should apply to the entire row, not a single column, so this is an invalid query.

1. 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, salary AS "Current Salary", salary \* 1.05 AS "Salary with 5% Raise"

FROM f\_staffs;

* This calculates a 5% raise and displays the result in a new column.

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

* DESCRIBE employees;
* This displays the structure of the employees table. Columns marked "nullable" can accept NULL values, meaning they are optional when inserting data.

1. 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 cd\_id AS "Inventory Item", title AS "CD Title", producer AS "Music Producer", year\_purchased AS "Year Purchased"

FROM d\_cds;

* This renames columns to the requested headings.

1. True/False -- The following SELECT statement executes successfully:  
   SELECT last\_name, job\_id, salary AS Sal  
   FROM employees;

* True

1. True/False -- The following SELECT statement executes successfully:  
   SELECT \*  
   FROM job\_grades;

* True

1. There are four coding errors in this statement. Can you identify them?  
   SELECT employee\_id, last\_name  
   sal x 12 ANNUAL SALARY  
   FROM employees;

* SELECT employee\_id, last\_name, salary \* 12 AS "ANNUAL SALARY" FROM employees;
  + Add \* 12 for multiplication.
  + Use AS for column alias.
  + Use proper syntax for arithmetic expressions.
  + Separate column definitions with commas.

1. In the arithmetic expression salary\*12 - 400, which operation will be evaluated first?

* Multiplication (salary\*12) will be evaluated first, followed by subtraction (- 400).

1. 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?  
   a. column names  
   b. \*  
   c. DISTINCT id  
   d. both a and b

* **b. \*** can be used to return all columns.

1. Using SQL to choose the columns in a table uses which capability?  
   a. selection  
   b. projection  
   c. partitioning  
   d. join

* **b. Projection** refers to selecting specific columns from a table.

1. SELECT last\_name AS "Employee". The column heading in the query result will appear as:  
   a. EMPLOYEE  
   b. employee  
   c. Employee  
   d. "Employee:

* **c. Employee** will appear exactly as written within the double quotes.

1. 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

* **b. SELECT salary\*(6 + 100)** evaluates multiplication with a larger value.

1. 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

* **c.** SELECT 'Mr./Ms. '||first\_name||' '||last\_name ||' '||'is an employee of our company.' AS "Employees"  
  FROM employees ;

1. 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.

* **c.** Keywords cannot be abbreviated or split across lines.

1. 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;

* **b.** Using DEPARTMENT\_ID, LAST\_NAME, and FIRST\_NAME will return columns in uppercase because they are written in uppercase.

1. Which statement below will likely fail?  
   a. SELCT \* FROM employees;  
   b. Select \* FROM employees;  
   c. SELECT \* FROM EMPLOYEES;  
   d. SelecT\* FROM employees;

* **a. SELCT \* FROM employees;** contains a typo in SELCT instead of SELECT.

1. 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.

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**Database Programming with SQL  
2-2: Limit Rows Selected  
Practice Activities**

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 |

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

* SELECT first\_name, last\_name, address FROM customers WHERE customer\_id = 456;

1. 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 promotions WHERE name = 'ballpen and highlighter';

1. 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 || ' Live in Concert' AS Oldest FROM recordings WHERE year = 1997;

1. 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 produce, title FROM d\_cds WHERE title = 'Carpe Diem';
* -- Correct capitalization

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

* SELECT title, year FROM d\_cds WHERE year < 2000;

1. 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

* Answer: **(a)** 5000, **(b)** 0 – 4999

**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)

1. 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';

1. 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';

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

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

1. 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;

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

* SELECT first\_name, last\_name, birth\_date FROM employees WHERE birth\_date < TO\_DATE('01-JAN-1980', 'DD-MON-YYYY');

**Database Programming with SQL  
2-3: Comparison Operators  
Practice Activities**

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** | 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 |

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;

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

* SELECT location\_type, comments FROM d\_venues WHERE location\_type = 'Private Home';

1. 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;

1. Create a list of all the DJs on Demand CD titles that have “a” as the second letter in the title.

* SELECT cd\_title FROM d\_cd\_inventory WHERE cd\_title LIKE '\_a%';

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

* SELECT partner\_name FROM d\_partners WHERE authorized\_expense\_amount IS NULL;

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

* SELECT last\_name AS "Possible Candidates" FROM employees WHERE last\_name LIKE '%s';

1. Which statement(s) are valid?  
   a. WHERE quantity <> NULL;  
   b. WHERE quantity = NULL;  
   c. WHERE quantity IS NULL;  
   d. WHERE quantity != NULL;

* **c. WHERE quantity IS NULL**: This is the correct way to check if a value is NULL.

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

* SELECT song\_title FROM d\_songs\_inventory WHERE type\_code IN (77, 12, 1);

**Database Programming with SQL  
3-1: Logical Comparisons and Precedence Rules  
Practice Activities**

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 |
| **Order of precedence** | Rules that determine the order in which expressions are evaluated and calculated |
| **OR** | Either condition can be true for a record to be selected |

1. 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');

* In this query, **both** conditions must be true. It only returns rows where the code is greater than 200 **and** the description is either 'Tropical', 'Football', or 'Carnival'.

SELECT code, description  
FROM d\_themes  
WHERE code >200 OR description IN('Tropical', 'Football', 'Carnival');

* In this query, **either** condition must be true. It returns rows where the code is greater than 200 **or** where the description is one of the three values ('Tropical', 'Football', 'Carnival').
* The key difference is the use of AND vs. OR. AND requires both conditions to be true, whereas OR requires only one condition to be true, leading to more rows being returned in the second query.

1. Display the last names of all Global Fast Foods employees who have “e” and “i” in their last names.

* SELECT last\_name FROM employees WHERE last\_name LIKE '%e%' AND last\_name LIKE '%i%';
* This query checks if the last name contains both "e" and "i" anywhere in the string.

1. 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, position, hourly\_rate FROM employees WHERE hourly\_rate > 6.50 AND position != 'Order Taker';

1. 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 last\_name FROM employees WHERE last\_name LIKE 'D%' AND last\_name LIKE '%a%' AND last\_name LIKE '%e%';

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

* SELECT venue FROM events WHERE company = 'DJs on Demand' AND venue != 'Private Home';

1. 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

* **c.** NOT, AND, OR
* NOT has the highest precedence, followed by AND, and then 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 FROM employees WHERE hire\_date > '1998-05-31' AND hire\_date < '1999-06-01' 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 email FROM employees WHERE hire\_date >= '1996-01-01' AND salary > 9000 AND commission\_pct IS NULL;

**Database Programming with SQL  
3-2: Sorting Rows  
Practice Activities**

Vocabulary  
Identify the vocabulary word for each definition below.

|  |  |
| --- | --- |
| **ASC** | Orders the rows in ascending order (the default order); A-Z |
| **DESC** | Orders the rows in descending order: Z-A |
| **Sort** | To arrange according to class, kind, or size |

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.  
   SELECT employee\_id, first\_name, last\_name  
   FROM employees;
   * SELECT employee\_id AS "Number", first\_name, last\_name FROM employees ORDER BY "Number";
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 title, year FROM djs\_on\_demand ORDER BY year ASC, title ASC;
3. Order the DJs on Demand songs by descending title. Use the alias “Our Collection” for the song title.
   * SELECT title AS "Our Collection" FROM djs\_on\_demand ORDER BY "Our Collection" DESC;
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, student\_id, parking\_place\_number 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.

A table with numbers and names

Description automatically generated

* + SELECT department\_id, last\_name, manager\_id FROM employees WHERE employee\_id < 125 ORDER BY department\_id ASC, last\_name ASC;

Extension Activities  
1. Limiting values with the WHERE clause is an example of:  
a. Projection  
b. Ordering  
c. Joining  
d. Grouping  
e. Selection

* + e. Selection

2. You want to sort your CD collection by title, and then by artist. This can be accomplished using:  
a. WHERE  
b. SELECT  
c. ORDER BY  
d. DISTINCT

* + c. ORDER BY

3. Which of the following are SQL keywords?  
a. SELECT  
b. ALIAS  
c. COLUMN  
d. FROM

* + a. SELECT  
    d. FROM

4. Which of the following are true?  
a. Multiplication and division take priority over addition.  
b. Operators of the same priority are evaluated from left to right.  
c. Parentheses can be used to override the rules of precedence.  
d. None of the above are true.

* + a. Multiplication and division take priority over addition.  
    b. Operators of the same priority are evaluated from left to right.  
    c. Parentheses can be used to override the rules of precedence.

5. The following query was written:  
SELECT DISTINCT last\_name  
FROM students  
a. To select all the outstanding students  
b. To choose last names that are duplicates  
c. To select last names without duplicates  
d. To select all last names

* + c. To select last names without duplicates

6. The following string was created using which SELECT clause?  
Abby Rogers is an order taker for Global Fast Foods  
a. SELECT first\_name ||' ' ||last\_name ||' is an ' staff\_type ' for Global Fast Foods'  
b. SELECT Abby Rogers is an ||staff\_type||' for Global Fast Foods'  
c. SELECT first\_name,last\_name '||staff\_type||' for Global Fast Foods'  
d. SELECT first\_name ||' ' ||last\_name ||' is an '||staff\_type||' for Global Fast Foods'

* + d. 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?  
a. SELECT id, last\_name, address, city, state, zip, phone\_number;  
b. SELECT ID, LAST\_NAME, ADDRESS, CITY, STATE, ZIP, PHONE\_NUMBER;  
c. SELECT Id, Last\_name, Address, City, State, Zip, Phone\_number;  
d. 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;

* + d. 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?  
a. SELECT last\_name AS ORDER BY FROM employees  
b. SELECT last\_name FROM employees ORDER BY last\_name  
c. SELECT last\_name FROM employees  
d. SELECT ASC last\_name FROM employees

* + b. SELECT last\_name FROM employees ORDER BY last\_name

9. Which SELECT clause will return a column heading for employee\_id called “New Employees”?  
a. SELECT last\_name AS "New Employees"  
b. SELECT employee\_id AS New Employees  
c. SELECT employee AS "New Employees"  
d. SELECT employee\_id 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

* + b. Jane Hendricks, sales manager, salary 15500

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;

* + Values **outside of 1900 and 2100** will not be returned.

13. Correct each WHERE clause:  
a. WHERE department\_id NOT IN 101,102,103;  
b. WHERE last\_name = King  
c. WHERE start date LIKE "05-May-1998"  
d. WHERE salary IS BETWEEN 5000 AND 7000  
e. WHERE id =! 10

* + a. WHERE department\_id NOT IN (101,102,103);  
    b. WHERE last\_name = 'King';  
    c. WHERE start\_date = '05-May-1998';  
    d. WHERE salary BETWEEN 5000 AND 7000;  
    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

* + 625, 410, 499

**Database Programming with SQL  
3-3: Introduction to Functions  
Practice Activities**

1. For each task, choose whether a single-row or multiple row function would be most appropriate:  
   a. Showing all of the email addresses in upper case letters
   * **Single-Row Function**: Because the transformation (upper case) applies individually to each email address.

b. Determining the average salary for the employees in the sales department

* + **Multiple-Row Function (AVG)**: The function needs to calculate the average salary across multiple rows (employees).

c. Showing hire dates with the month spelled out (September 1, 2004)

* + **Single-Row Function**: Formatting the date to show the month spelled out is an operation on individual rows.

d. Finding out the employees in each department that had the most seniority (the earliest hire

* + **Multiple-Row Function (MIN)**: We need to find the minimum (earliest) hire date across multiple rows (employees) within each department.

date)  
e. Displaying the employees’ salaries rounded to the hundreds place

* + **Single-Row Function**: Rounding each employee's salary happens at the individual row level.

f. Substituting zeros for null values when displaying employee commissions.

* + **Single-Row Function**: Null value substitution occurs on individual rows for each employee.

1. The most common multiple-row functions are: AVG, COUNT, MAX, MIN, and SUM. Give your own definition for each of these functions
   * AVG (Average): This function calculates the mean value of a numeric column by summing all values and dividing by the number of rows.
   * COUNT: This function counts the number of non-null rows in a column.
   * MAX: This function returns the maximum value from a column of data.
   * MIN: This function returns the minimum value from a column of data.
   * SUM: This function calculates the total sum of all values in a numeric column.
2. Test your definitions by substituting each of the multiple-row functions into this query.  
   SELECT FUNCTION(salary)  
   FROM employees  
   Write out each query and its results.
3. **Average Salary (AVG)**

* SELECT AVG(salary) FROM employees;

1. **Count of Employees (COUNT)**

* SELECT COUNT(salary) FROM employees;

1. **Maximum Salary (MAX)**

* SELECT MAX(salary) FROM employees;

1. **Minimum Salary (MIN)**

* SELECT MIN(salary) FROM employees;

1. **Sum of Salaries (SUM)**

* SELECT SUM(salary) FROM employees;