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Oracle DB Training - Programming 2,3

1-3: Anatomy of a SQL Statement

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/Field = 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 = Mathematical equation
Selection = The capability in SQL to choose the rows in a table returned from a query.
Query = Retrieves information from the database
SELECT = extract data value
FROM = Specifies the table containing the column listed in select clause
Statement = individual SQL command
Clause = Part of SQL statement

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 x,y,z
FROM table_random;
```

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 addresses 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) +.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 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)

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

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

- This query will list out columns employee_id and last_name from the employees table.

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. null * 25 = 0;
b. null * 6.00 = 6.00
c. null * .05 = null
d. (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

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

Vocabulary
Identify the vocabulary word for each definition below.

Distinct = A command that suppresses duplicates

Concatenate = Links two columns together to form one character data column
String = A group of character data
Describe = 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, mailing_address
```

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

a.
```
SELECT first_name
FROM f_staffs;
```
b.
```
SELECT first_name || ` ` || last_name AS "DJs on Demand
Clients"
FROM d_clients;
```
c.
```
SELECT DISTINCT f_order_lines
FROM quantity;
```
d.
```
SELECT order_number
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?

```
DESCRIBE EMPLOYEES
```

Nullable columns would contain null values that are unknown/not applicable.

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
```

```
    inventory_item AS "Inventory Item",
    cd_title AS "CD Title",
    music_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;
```

TRUE

9. True/False -- The following SELECT statement executes successfully:

```
SELECT *
FROM job_grades;
```

TRUE

10.There are four coding errors in this statement. Can you identify them?

```
SELECT employee_id, last_name
sal x 12 ANNUAL SALARY
FROM employees;
```

- Missing comma after last_name
- Alias needs AS
- Should be * instead of x
- ANNUAL SALARY needs to be preceded by AS

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?

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

13. Using SQL to choose the columns in a table uses which capability?

a. selection
b. projection
c. partitioning
d. Join

14. SELECT last_name AS "Employee". The column heading in the query result will appear as:

a. EMPLOYEE
b. employee
c. Employee
d. "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. SELCT * 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.

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

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

2-2: Limit Rows Selected

Vocabulary
Identify the vocabulary word for each definition below.

WHERE = Restricts the rows returned by a select statement
Operators such as =. <, >, !=, etc.= 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;
```

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

```
SELECT
     first_name,
     start_date,
     end_date
FROM
     Promotion_items
WHERE
     Item_name = 'ball pen and highlighter’;
```

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 ' || title || ' recording in our database is ' ||
title AS "Oldest"
FROM
    recordings
WHERE
    release_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' ;
```

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.

```
SELECT title, year_produced
FROM D_CDs
WHERE year_produced < 2000;
```

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

```
SELECT salary
FROM employees
WHERE salary < = 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)
```

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, name
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_produced
FROM D_CDs
WHERE year_produced <> 2000;
```

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

```
SELECT *
FROM employees
WHERE
     birthdate < TO_DATE('1980-01-01', 'YYYY-MM-DD');
```

2-3: Comparison Operators

Vocabulary

Identify the vocabulary word for each definition below

This option identifies that the escape characters should be interpreted literally
Answer: LIKE

Condition tests for null values
Answer: IS NULL
Displays rows based on a range of values Including the specified limits and the area between them; the numbers 1-10, inclusive
Answer: BETWEEN…AND

Selects rows that match a character pattern
Answer: LIKE

Tests for values in a specified list of values
Answer: IN

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 global_fast_foods_staff
WHERE salary BETWEEN 5.00 AND 10.00;
```

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

```
SELECT location_type, comments
FROM djs_on_demand_venues
WHERE location_type = 'private_home';
```

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 >= 20.00 AND <= 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 cd_title
FROM djs_on_demand_cds
WHERE cd_title LIKE '_a%';
```

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

```
SELECT partner_name
FROM djs_on_demand_partners
WHERE  authorized_expense IS NULL
```

6. 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';
```

7. Which statement(s) are valid?

c. WHERE quantity IS NULL;

8. 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 djs_on_demand_inventory
WHERE type_code IN (77, 12, 1);
```

3-1: Logical Comparisons and Precedence Rules

Vocabulary

Identify the vocabulary word for each definition below

Inverts the value of the condition
Answer: NOT

Both conditions must be true for a record to be selected
Answer: AND

Rules that determine the order in which expressions are evaluated and calculated
Answer: Precedence

Either condition can be true for a record to be selected
Answer: OR

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

2. 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%’;
```

3. 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 *
FROM employees
WHERE salary > 6.50 AND position != ‘order_taker’;
```

4. 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%';
```

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

```
SELECT location_type
FROM djs_on_demand_venues
WHERE location_type != 'private_home'
```

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

c. NOT, AND, OR

7. Write SQL statements that will produce the desired output: 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 *
FROM employees
WHERE hire_date > '1998-05-31' AND hire_date < '1999-06-01' AND
salary < 8000 AND last_name LIKE '%en%';
```

8. Write SQL statements that will produce the desired output: 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 *
FROM employees
WHERE hire date >= '1996-01-01' AND salary >= 9000 AND
commission IS NULL;
```

3-2 - DB programming with SQL

A. Objectives

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

B. Vocabulary

a. **ORDER BY Clause or ASC** = Order the row in ascending order (the default order); A-Z
b. **ORDER BY "Column 1" DESC** = Order the rows in Descending order: Z- A
c. **ORDER BY** = To arrange according to class, kind, or size

C. Try It/ Solve it

a. 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
   i. SELECT employee_id, first_name, last_name
      FROM employees;

      SELECT employee_id AS Number
      FROM employees
      ORDER BY Number;

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

   SELECT CD_titles
   FROM DJ_list
   ORDER BY year;

   Or

   SELECT CD_titles
   FROM DJ
   ORDER BY year ASC;

c. Order the DJ's on demand songs by descending title. Use the alias "Our Collection" for the song title

   SELECT songs AS 'Our collection"
   FROM DJ_list

ORDER BY song_titles

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

SELECT * FROM DJ_list
ORDER BY DJ_id

e. Create a list of students who are in their first year of school. Including the first name , last name , student ID number, and Parking place number. Sort the results alphabetically by the student's 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 student_list
WHERE year = 1
ORDER BY last_name ASC, first_name DESC;
```

f. 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 employees_ID < 125

```
SELECT * FROM employees
WHERE employee_id < 125
```

D. Extension Activity

1. Limiting values with the WHERE clause is an example of
   e. Selection

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

3. Which of the following are SQL keywords?
   a. SELECT
   b. 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 the right.

c. Parentheses can be used to override the rules of precedence.

5. The following query was written:

```
SELECT DISTINCT last_name
FROM students
```

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

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?

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?

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"?

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?

c.Arnie Smithers, administration president, 20000

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

```
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;
```

1. Salaries **below** 1900 (e.g., 1800, 1500)
2. Salaries **above** 2100 (e.g., 2200, 2500)
3. Salaries **exactly** 1900 and **exactly** 2100 are included

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

3-3 - Programming with SQL [Functions]

A. Objectives
   a. Identify appropriate application of single-row function in query statements
   b. Classify a function as a single-row or multi-row function
   c. Differentiate between single-row functions and multirow functions and the result returned by each

B. Try it/ Solve it
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**
      Ex - SELECT UPPER(email) FROM employees;

b. Determining the average salary for the employees in the sale department - **Multi**

```
SELECT AVG(salary)
FROM employees WHERE department = 'Sales';
```

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

```
SELECT TO_CHAR(hire_date, 'Month DD, YYYY')
 FROM employees;
```

d. Finding out the employees in each department that had the most seniority (earliest hire date)- **Multi**

```
SELECT department_id, MIN(hire_date)
FROM employees
GROUP BY department_id;
```

e. Displaying the employees' salaries rounded to the hundreds place - **Single**

```
SELECT ROUND(salary, -2) FROM employees;
```

f. Substituting 0 for null values when displaying employee commision - **Single**

```
SELECT NVL(commission, 0) FROM employees;
```

2. The most common multiple-row functions are: AVG, COUNT, MAX, MIN, and SUM. Give your own definition for each of these functions
   a. **AVG** - will take the average or median value of all record selected in a query
   b. **COUNT** - This function can count specific variable for frequency or how many instances of that variable exist within a table
   c. **MAX** - Will review record wanted from a query and find the *highest* value
   d. **MIN** - Will review records wanted from a query to find the *lowest* value
   e. **SUM** - will calculate addition to a numerical column within a table to find overall total

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

```
SELECT FUNCTION (salary)
FROM employees
```

4. Write out each query
    1. SELECT AVG(salary)
       FROM employees;
    2. SELECT COUNT(salary)
       FROM employees;
    3. SELECT MAX(salary)
       FROM employees;
    4. SELECT MIN(salary)
       FROM employees;
    5. SELECT SUM(salary)
       FROM employees;