Week 3: Programming 1,2,3

Practice: 1-3

Asterisk symbol (*)	Display data from two or more related tables
Arithmetic operators	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	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

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 grades ←
   From student

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

Keywords: SELECT, FROM
Clauses:
- SELECT clause “SELECT employee_id, last_name”
- FROM clause “FROM employees”

Statement
- The entire example is a 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 because you retrieved a specific record (row)
b. I would like only the manager_id column, and none of the other columns. PROJECTION because you retrieved a specific columns (manager_id)

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

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

DISTINCT	A command that suppresses duplicates
CONCATENATION || “ “ ||	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, mailing_addresses
   FROM customers;

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 last_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?

If the column is marked as nullable, it means that the column can contain a NULL value, and if it cannot, that means that it must always have a value.

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;
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,
sal * 12 as “ ANNUAL SALARY”
FROM employees;
11. In the arithmetic expression salary*12 - 400, which operation will be evaluated first?
salary*12

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|| '+++' || '+++' as "Super Star"
From f_staffs
Where first_name IN ('Sue', 'Bob', 'Monique');
```

Practice 2-2

Vocabulary

WHERE clause	Restricts the rows returned by a select statement
= , > , >=, <, <=, <>	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 name, start_date, end_date
   FROM promotion_item
   WHERE item_name = "ballpen 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 ' || year|| 'recording in our database is' || title AS oldest
   FROM recordings
   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 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.

   ```
   SELECT title, year
   FROM d_cds
   WHERE year <2000;
   ```

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
   ALL OF THE ABOVE

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 AS “student name”, fname AS “first name”, lname AS “last 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 name”
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

```
SELECT *
FROM f_staffs
WHERE birthdate < ‘01-JAN-1980’;
```

Practice 2-3

ESCAPE	The 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 value
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 and 10;

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

   SELECT loc_type, comments
   FROM d_venues
   WHERE loc_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 title
   FROM d_cds
   WHERE title LIKE '_a%'

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

   SELECT *
   FROM d_partners
   WHERE aut_expense_amt = 0 OR auto_expense_amt 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 first_name || ' ' || last_name as "Possible Candidates"
   FROM employees
   WHERE last_name LIKE '%s'

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

SELECT title as "SONG"
FROM d_songs
WHERE type_code IN (77,12,1);

Practice 3-1

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

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');
   ```

   The first statement uses AND, so either side must return true. The second statement uses OR, which may return more data, because one of the sides has to be true to return, and does not require that both sides of the OR to be true.

2. 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%’
   ```

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 first_name || ‘ ‘ || last_name as “Full Name”
   FROM f_staffs
   WHERE salary >6.5 AND staff_type = ‘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 first_name || ‘ ‘ || last_name as “Full 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 DISTINCT d_venues.loc_type
   FROM d_events JOIN d_veneus ON d-Events.venue_id = d_venues.id
   ```

WHERE d_venues.loc_type!= ‘Private Home’

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? Diana Lorentz
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 as “Full Name”
FROM employees
WHERE hire_date > ‘31-May-1988’ AND hire_date < ‘01-Jun-1999’ AND salary <8000 AND
last_name LIKE ‘%en%’;
```

8. What's my email address? mhartste@institutedomain.com
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 LOWER(email) || ‘@institutedomain.com’ AS “Email Address”
FROM employees
WHERE salary >9000 AND (commission_pct = 0 OR commission_pct IS NULL) AND hire_date
<= ‘31-Mar-1996’;
```

Practice 3-2

ASC	Orders the rows in ascending order (the default order); A-Z
DESC	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.

```
SELECT employee_id, 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
```

```
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.

```
SELECT title as “Our Collection”
FROM d_cds
ORDER BY title DESC;
```

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

```
SELECT first_name, last_name, student_id, parking_number
FROM students
WHERE year = 1
ORDER BY last_name, first_name DESC;
```

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).

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 DESC, last_name DESC;
```

Extension Activities

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

a. Projection
b. Ordering
c. Joining
d. Grouping
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

3. Which of the following are SQL keywords?

a. SELECT
b. ALIAS
c. COLUMN

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.

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

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'

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;

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

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"

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
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;
```

Salaries above 2100, and below 1900

13. Correct each WHERE clause:

a. WHERE department_id NOT IN (101,102,103);
b. WHERE last_name = ‘King’
c. WHERE start_date = ‘05-May-1998’
d. WHERE salary ~~IS~~ 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

Practice 3-3
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 row
    b. Determining the average salary for the employees in the sales department--multiple row
    c. Showing hire dates with the month spelled out (September 1, 2004)--single row
    d. Finding out the employees in each department that had the most seniority (the earliest hire date)--multiple row
    e. Displaying the employees' salaries rounded to the hundreds place--single row
    f. Substituting zeros for null values when displaying employee commissions.--single row

2. The most common multiple-row functions are: AVG, COUNT, MAX, MIN, and SUM. Give your own definition for each of these functions.
AVG: calculate average value in group of rows
COUNT: counts number of rows input
MAX: finds highest value in the group of rows
MIN: finds lowest value in the group of rows
SUM: adds values in group of rows
3. 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.

```
SELECT AVG(salary)
FROM employees;
```
→ answer: 8775

```
SELECT COUNT(salary)
FROM employees;
```
→ answer: 20

```
SELECT MAX(salary)
```

FROM employees;
→ answer: 24000

SELECT MIN(salary)
FROM employees;
→ answer: 2500

SELECT SUM(salary)
FROM employees;
→ answer: 175500