Task 4: Aggregate Functions and Grouping

1.What is GROUP BY?

The GROUP BY statement is used in conjunction with the aggregate functions to group the result-set by one or more columns.

Syntax:

```
SELECT column_name,aggregate_function(column_name)
FROM table_name
WHERE column_name operator value
GROUP BY column_name
```

Example:

Table:Orders

O_Id	OrderDate	OrderPrice	Customer
1	2008/11/12	1000	Hansen
2.	2008/10/23	1600	Nilsen
3	2008/09/02	700	Hansen
4	2008/09/03	300	Hansen
5	2008/08/30	2000	Jensen
6	2008/10/04	100	Nilsen

Query:

```
SELECT Customer,SUM(OrderPrice)
FROM Orders
GROUP BY Customer
```

Result:

Customer	SUM(OrderPrice)
Hansen	2000
Nilsen	1700
Jensen	2000

2.Difference between WHERE and HAVING?

WHERE Clause	HAVING Clause
Filters rows before groups are aggregated.	Filters groups after the aggregation process..
WHERE Clause can be used without GROUP BY Clause	HAVING Clause can be used with GROUP BY Clause
WHERE Clause implements in row operations	HAVING Clause implements in column operation

WHERE Clause cannot contain aggregate function	HAVING Clause can contain aggregate function
WHERE Clause can be used with SELECT, UPDATE, DELETE statement.	HAVING Clause can only be used with SELECT statement.
WHERE Clause is used before GROUP BY Clause	HAVING Clause is used after GROUP BY Clause
WHERE Clause is used with single row function like UPPER, LOWER etc.	HAVING Clause is used with multiple row function like SUM, COUNT etc.

3.How does COUNT(*) differ from COUNT(column)?

- COUNT(*) returns the number of rows in the table
- COUNT(COLUMN) returns the number of non-NULL values in the column

Syntax Of COUNT(*) :

select COUNT(*) FROM Department;
count
Example:
Table:Orders

O_Id	OrderDate	OrderPrice	Customer
1	2008/11/12	1000	Hansen
2	2008/10/23	1600	Nilsen
3	2008/09/02	700	Hansen
4	2008/09/03	300	Hansen
5	2008/08/30	2000	Jensen
6	2008/10/04	100	Nilsen

Result:

6
(1 row)

Syntax Of COUNT(COLUMN**) :**

```
select COUNT(id) FROM Department;
 count
```

Result:

```
   6
(1 row)
```

4.Can you group by multiple columns?

Yes, you can group by multiple columns.

Syntax:

```
SELECT column1, column2, AGGREGATE_FUNCTION(column3)
FROM your_table
GROUP BY column1, column2;
```

5.What is ROUND() used for?

The ROUND() function is used to round a numeric field to the number of decimals specified.

Syntax:

```
SELECT ROUND(column_name,decimals) FROM table_name
```

Example:

Table:Products

Prod_Id	ProductName	Unit	UnitPrice
1	Jarlsberg	1000 g	10.45
2	Mascarpone	1000 g	32.56
3	Gorgonzola	1000 g	15.67

Query:

```
SELECT ProductName, ROUND(UnitPrice,0) as UnitPrice FROM Products
```

Result:

ProductName	UnitPrice
Jarlsberg	10
Mascarpone	33
Gorgonzola	16

6.How do you find the highest salary by department?

```
SELECT   DepartmentId,   MAX(Salary) AS HighestSalary
FROM     Employee
GROUP BY DepartmentId;
```

7.What is the default behavior of GROUP BY?

The default behavior of GROUP BY in SQL is to:

- Group rows that have the same values in the specified column(s)
- It collapses these rows into a single row for each unique combination of values in the GROUP BY column(s).
- This is typically used with aggregate functions (like SUM(), COUNT(), AVG(), etc.) to summarize data.

Example:
Table: Orders

customer_id	product_id	quantity
1	101	2
1	101	3
2	101	1

Query:

```
SELECT customer_id, product_id, SUM(quantity)
FROM orders
GROUP BY customer_id, product_id;
```

Result:

customer_id	product_id	sum
1	101	5
2	101	1

8.Explain AVG and SUM.

AVG:
Avg is a SQL aggregate functions which return average value.
Syntex:

```
SELECT AVG(column_name) FROM table_name
```

Example:
Table:Orders

O_Id	OrderDate	OrderPrice	Customer
1	2008/11/12	1000	Hansen
2	2008/10/23	1600	Nilsen
3	2008/09/02	700	Hansen
4	2008/09/03	300	Hansen
5	2008/08/30	2000	Jensen
6	2008/10/04	100	Nilsen

Query:

```
SELECT AVG(OrderPrice) AS OrderAverage FROM Orders
```

Result:

OrderAverage
950

SUM:
Sum is a SQL aggregate functions which return sum value.
Syntax:

```
SELECT SUM(column_name) FROM table_nameSQL SUM() Syntax
SELECT SUM(column_name) FROM table_name
```

Example:
Table:Orders

O_Id	OrderDate	OrderPrice	Customer
1	2008/11/12	1000	Hansen
2	2008/10/23	1600	Nilsen

3	2008/09/02	700	Hansen
4	2008/09/03	300	Hansen
5	2008/08/30	2000	Jensen
6	2008/10/04	100	Nilsen

Query:

SELECT SUM(OrderPrice) AS OrderTotal FROM Orders

Result:

OrderTotal
5700

9.How to count distinct values?

SQL COUNT(DISTINCT column_name) Syntax

The COUNT(DISTINCT column_name) function returns the number of distinct values of the specified column:

SELECT COUNT(DISTINCT column_name) FROM table_name

Note: COUNT(DISTINCT) works with ORACLE and Microsoft SQL Server, but not with Microsoft Access.

10.What is an aggregate function?

An aggregate function is a function which returns a single value, calculated from values in a column.

Useful aggregate functions:

AVG() - Returns the average value
COUNT() - Returns the number of rows
FIRST() - Returns the first value
LAST() - Returns the last value
MAX() - Returns the largest value
MIN() - Returns the smallest value
SUM() - Returns the sum
