Functions in SQL

Learning Objectives

By the end of this lesson, you will be able to:

- Illustrate SQL functions
- Identify aggregate functions
- Outline date and time, numeric, and advance functions
- List general, duplicate, and inline functions

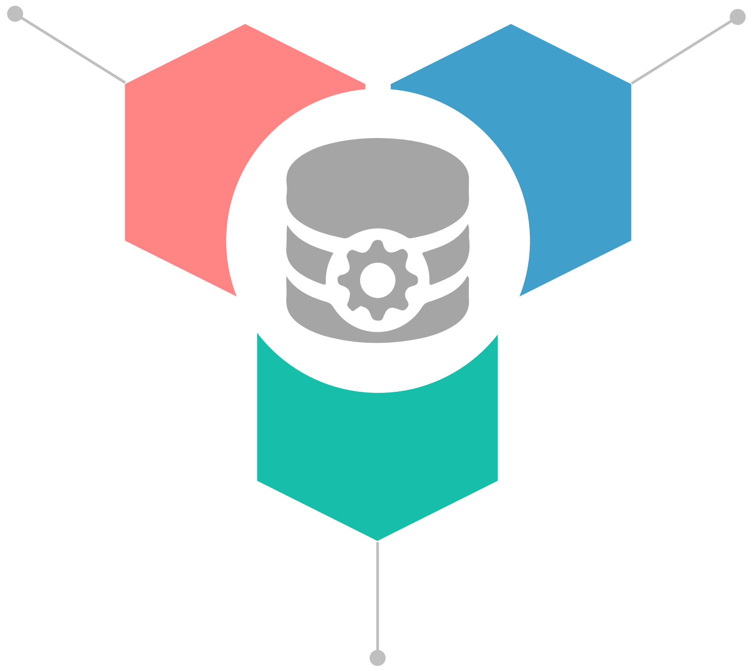
Understanding SQL Functions

Understanding SQL Functions

- SQL functions are basic subprograms used extensively to handle or manipulate data.
- SQL functions enhance database speed and performance.
- SQL functions are short programs with one or more input parameters but just one output value.

Advantages of SQL Functions

Boost the database's efficiency and productivity



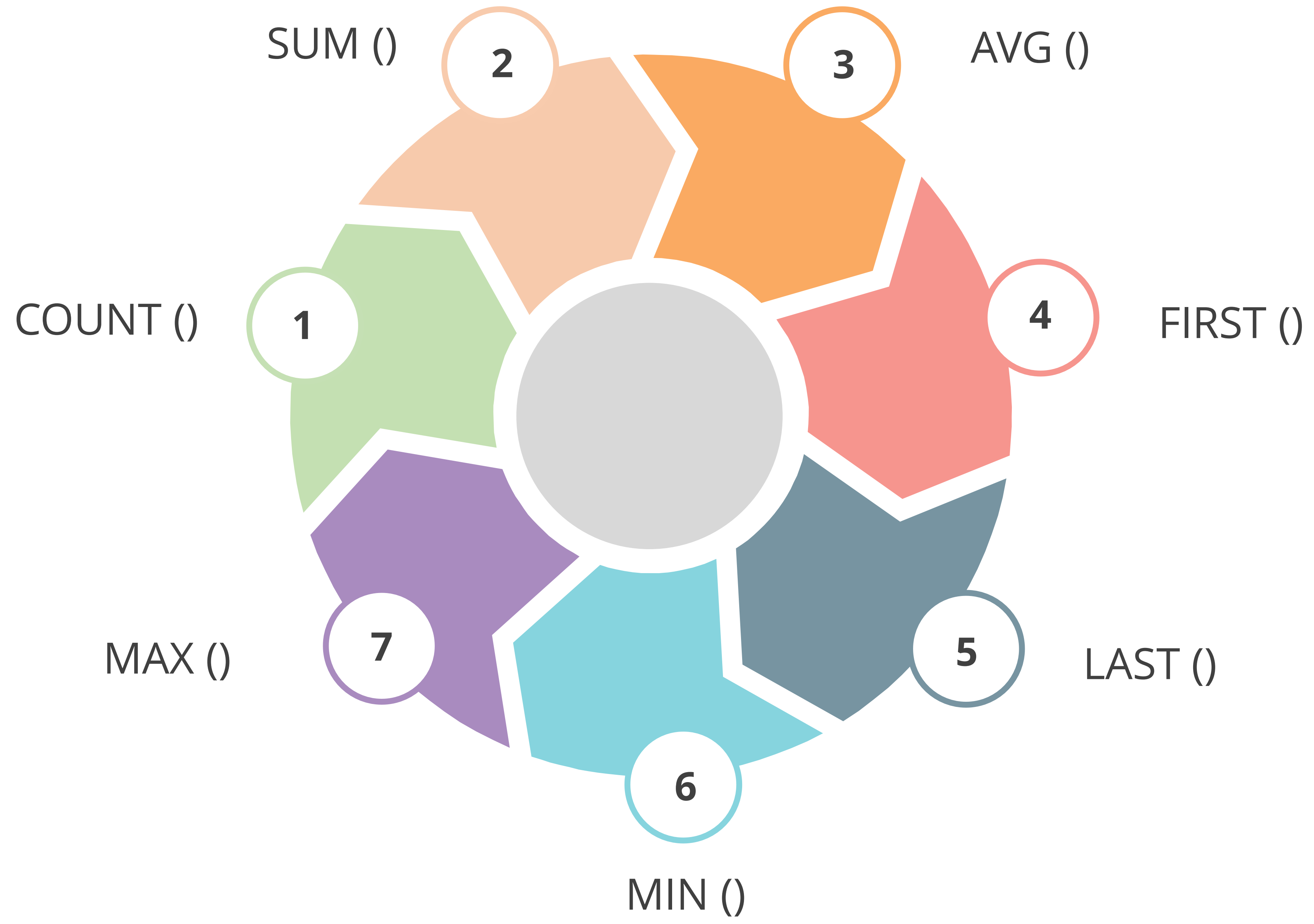
Are compiled and cached

Are complicated mathematical logic that can be broken down into simpler functions.

Aggregate Functions

Aggregate Functions and Its Types

The aggregate functions allow performing the calculation on a set of values to return a single scalar value.



Count Function

Definition

Count function returns the total number of rows in a specified column or a table.

Syntax

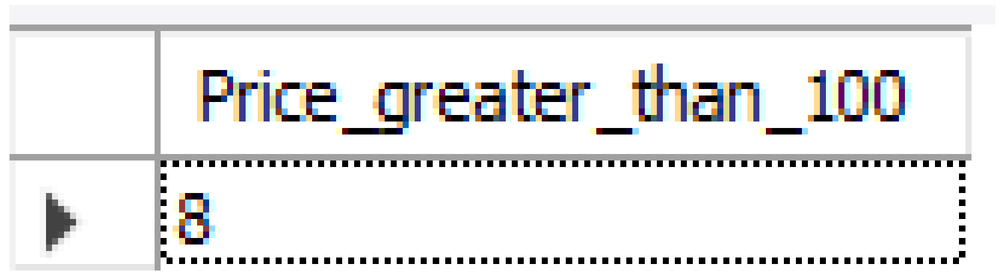
```
SELECT COUNT (column name)
FROM table name
WHERE condition;
```

Count Example

Example

```
SELECT COUNT(price) as
Price_greater_than_100 FROM product
WHERE price > 100;
```

Output



```
Price_greater_than_100
8
```

Sum Function

Definition

Sum function returns the sum of values from a particular column.

Syntax

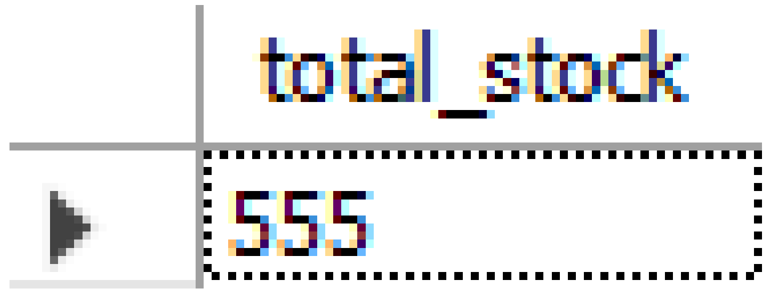
```
SELECT SUM (column name)
FROM table name;
```

Sum Example

Example

```
SELECT SUM(stock) as total_stock FROM
product;
```

Output



```
total_stock
555
```

Average Function

Definition

Average function returns the average value of a particular column.

Syntax

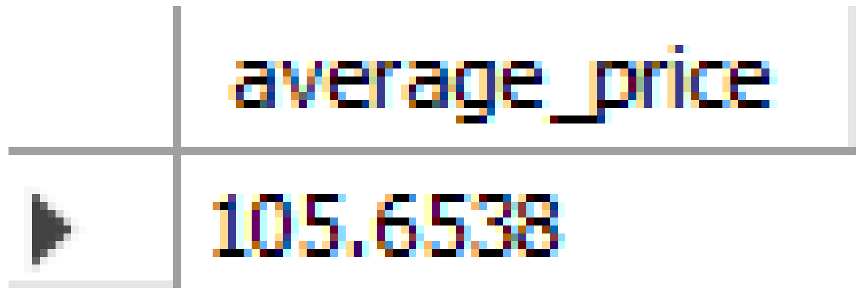
```
SELECT AVG (Column name)
FROM table name;
```

Average Example

Example

```
SELECT AVG(price) as average_price FROM
product;
```

Output



```
average_price
105.6538
```

First Function

Definition

First function returns the first field value of the given column.

Syntax

```
SELECT column_name FROM
table_name LIMIT value;
```

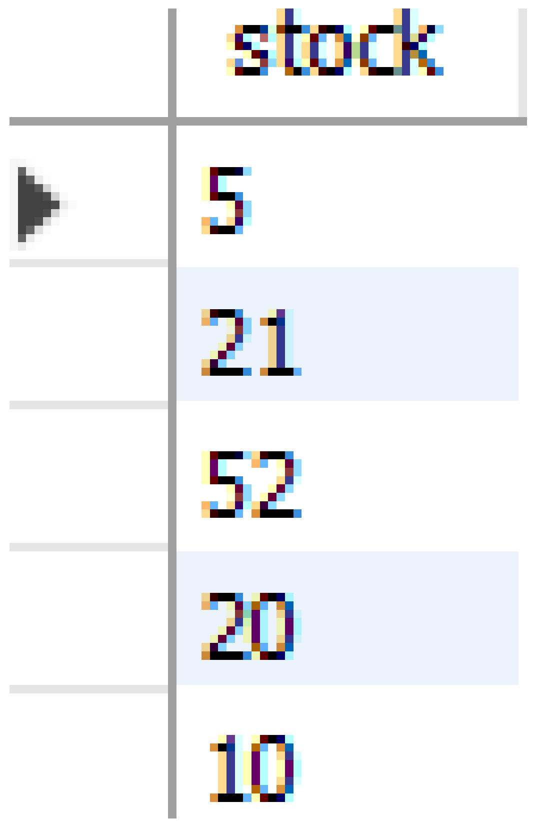
Note: Functions like FIRST and LAST are typically more prevalent in databases such as certain versions of Microsoft SQL Server and PostgreSQL.

First Example

Example

```
SELECT stock FROM product LIMIT 5;
```

Output



```
stock
5
21
52
20
10
```

Last Function

Definition

Last function returns the last field value of the given column.

Syntax

```
SELECT column_name FROM table_name
ORDER BY column name DESC LIMIT
value;
```

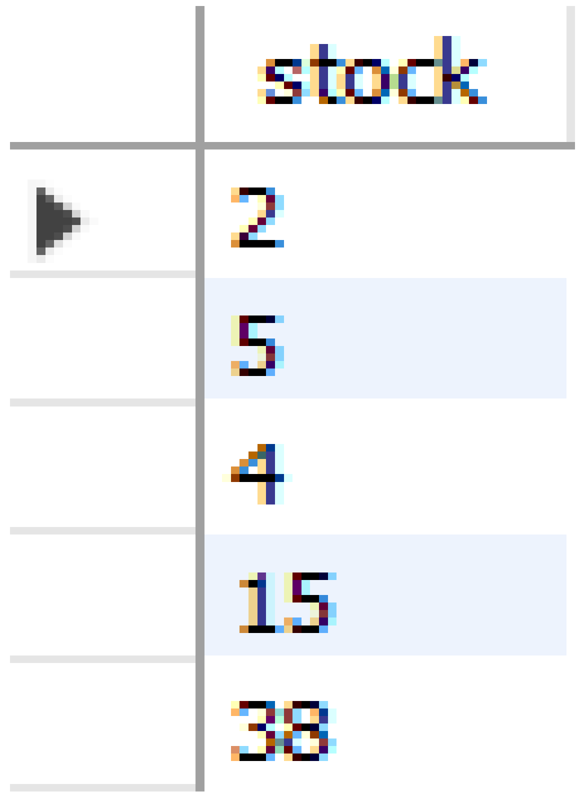
Note: Functions like FIRST and LAST are typically more prevalent in databases such as certain versions of Microsoft SQL Server and PostgreSQL.

Last Example

Example

```
SELECT stock FROM product ORDER BY
p_code DESC LIMIT 5;
```

Output



stock
2
5
4
15
38

Min Function

Definition

Min function returns the minimum value of the given column.

Syntax

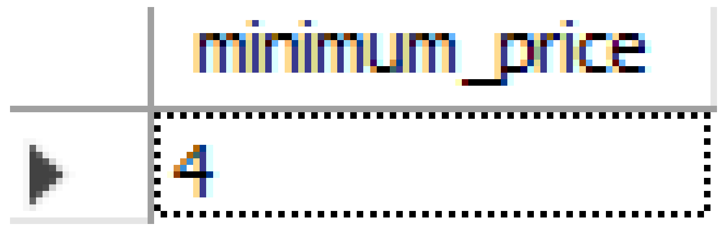
```
SELECT MIN(column_name) FROM
table_name;
```

Min Example

Example

```
SELECT MIN(price) as minimum_price FROM
product;
```

Output


minimum_price
4

Max Function

Definition

Max function returns the maximum value of the given column.

Syntax

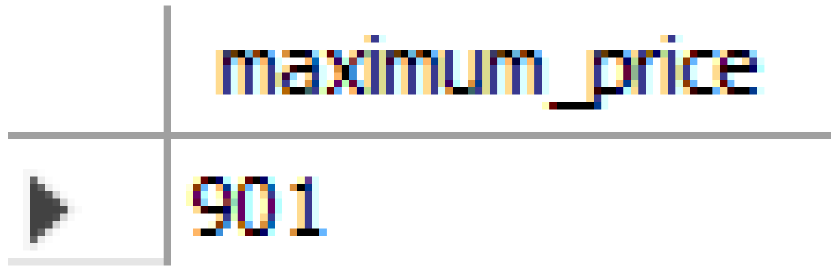
```
SELECT MAX(column_name) FROM
table_name;
```

Max Example

Example

```
SELECT MAX(price) as maximum_price FROM
product;
```

Output



maximum_price
901

Problem Statement

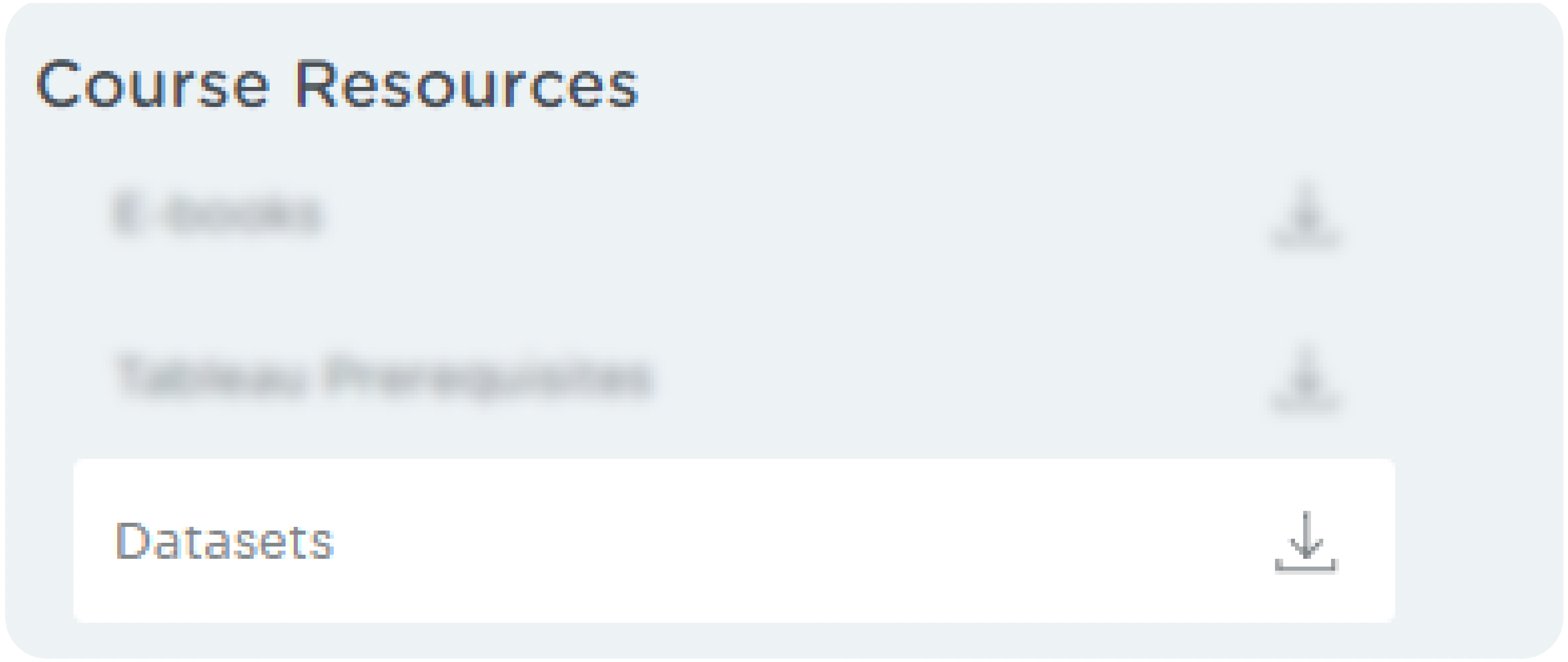
Problem Scenario: You are working in a superstore as a junior database administrator. Your manager has asked you to collect data from the superstore’s table with the schema named as **example** to check and improve the sales records and growth of your store by performing a queried operation on the database.

Objective: You should determine the sum of the sales and profit columns, calculate the average profit, count the total number of products with a price greater than 100, and calculate the maximum profit and loss from the superstore table.

Problem Statement

Steps to be performed:

1. Download the **superstore** table from the course resources and import it in MySQL workbench.



Solution

Query

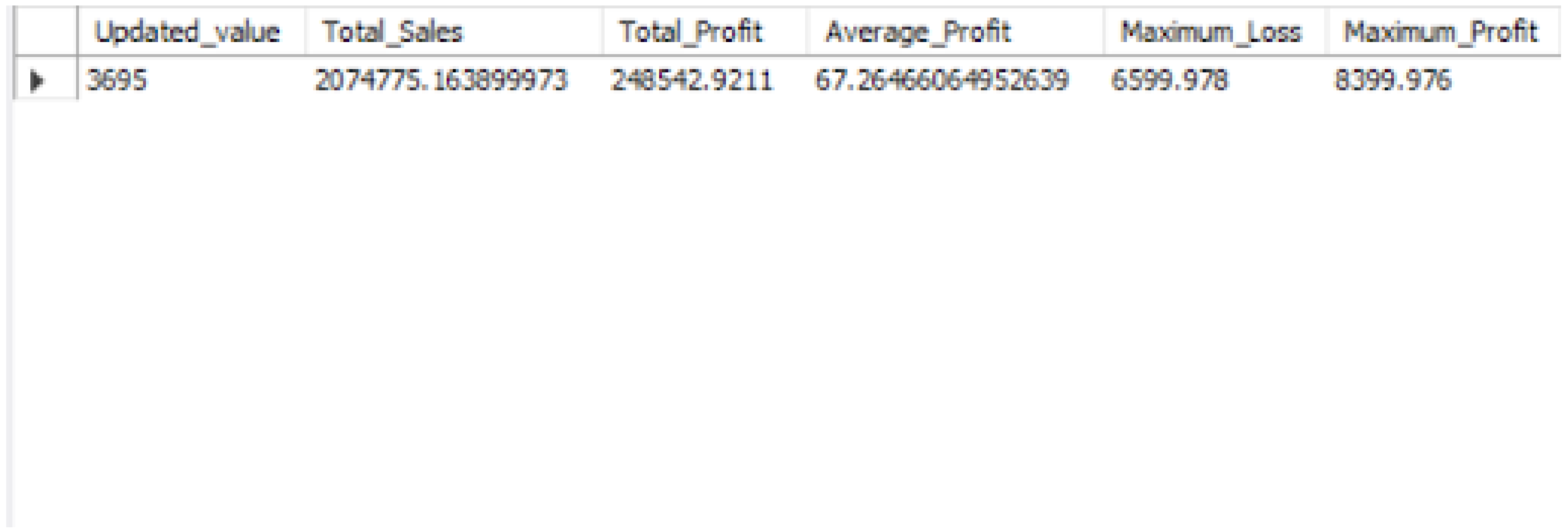
```
SELECT COUNT(Sales) as Updated_value, sum(Sales) as Total_Sales, Sum(Profit) as Total_Profit,
avg(Profit) as Average_Profit, ABS(min(Profit)) as Maximum_Loss, max(Profit) as Maximum_Profit

FROM example.superstore

WHERE Sales > 100;
```

Output

After executing the query, we get the updated value of the sales, profit, and average profit columns.



	Updated_value	Total_Sales	Total_Profit	Average_Profit	Maximum_Loss	Maximum_Profit
▶	3695	2074775.163899973	248542.9211	67.26466064952639	6599.978	8399.976

Problem Statement

Problem Scenario: You are working in a superstore as a junior database administrator. Your manager has asked you to retrieve the first ten records of sales that were made during the opening of the store.

Objective: You are required to extract the first ten records of the sales column from the superstore table.

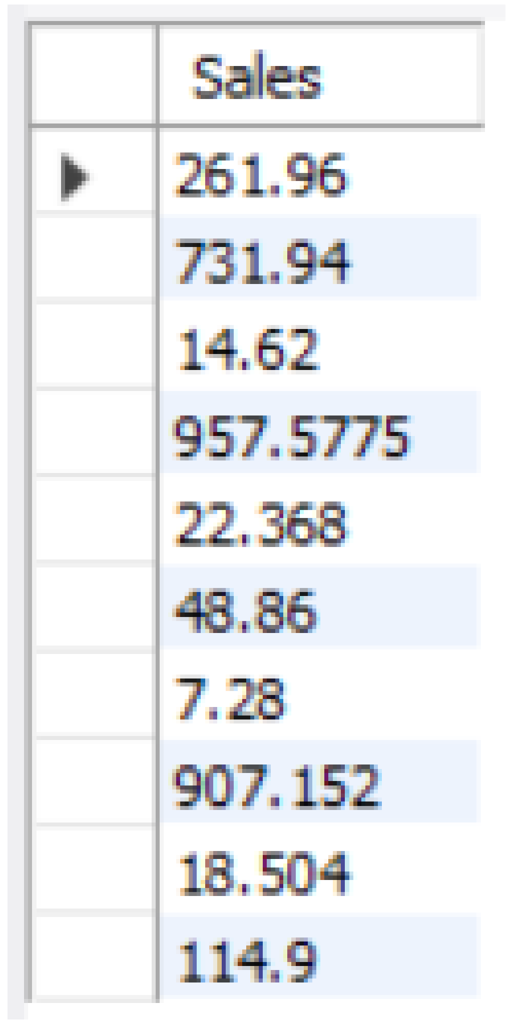
Solution

Query for FIRST ten records

```
SELECT Sales
FROM superstore limit 10;
```

Output

After executing the query, the first ten records of the database are shown as the following output:



	Sales
▶	261.96
	731.94
	14.62
	957.5775
	22.368
	48.86
	7.28
	907.152
	18.504
	114.9

Problem Statement

Problem Scenario: You are working in a superstore as a junior database administrator. Your manager has assigned you the task of identifying the top twenty sales records.

Objective: You are required to analyze the superstore table by sorting the column sales in descending order and finding the first twenty records.

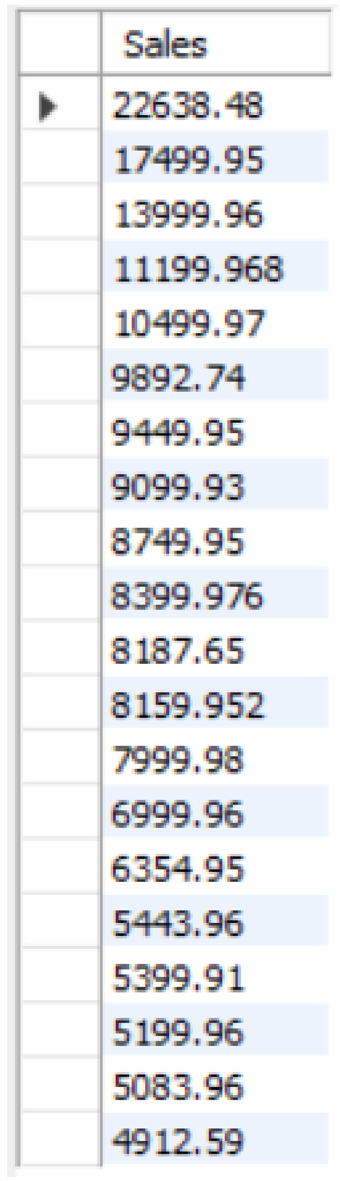
Solution

Query for LAST twenty records

```
SELECT Sales
FROM superstore
ORDER BY Sales DESC limit 20;
```

Output

After executing the query, the first twenty records sorted in descending order will be shown as the following output:

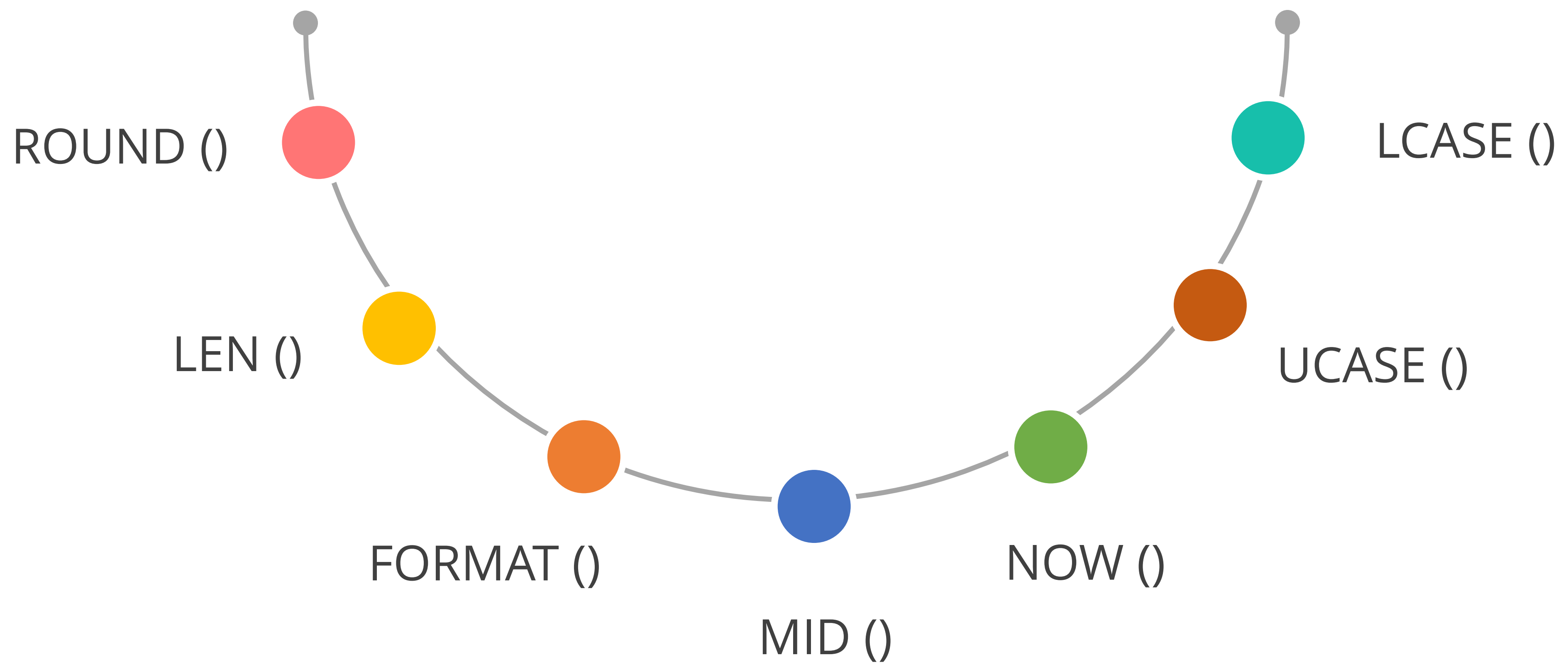


	Sales
▶	22638.48
	17499.95
	13999.96
	11199.968
	10499.97
	9892.74
	9449.95
	9099.93
	8749.95
	8399.976
	8187.65
	8159.952
	7999.98
	6999.96
	6354.95
	5443.96
	5399.91
	5199.96
	5083.96
	4912.59

Scalar Functions

Scalar Functions

The scalar functions return a single value from an input value. It works on each record independently.



Round Function

Definition

Round function helps to round a value to a specified number of places.

Syntax

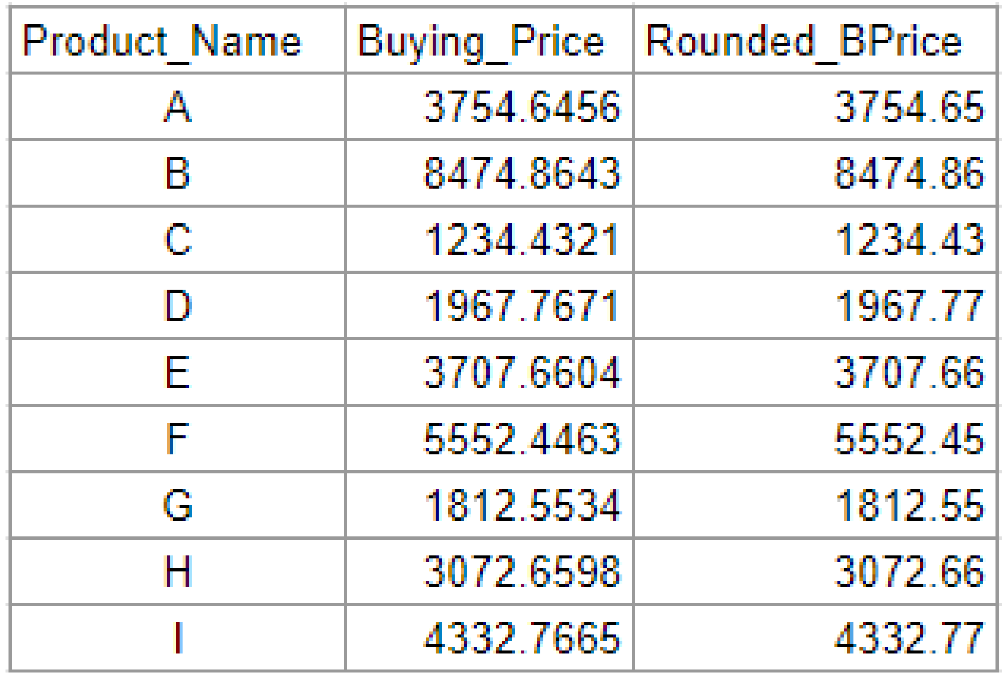
```
ROUND(column_name, decimals)
```

Round Example

Example

```
SELECT Product_name, Buying_price,
    ROUND(Buying_price, 2) AS
Rounded_Bprice,
FROM Product;
```

Output



Product_Name	Buying_Price	Rounded_BPrice
A	3754.6456	3754.65
B	8474.8643	8474.86
C	1234.4321	1234.43
D	1967.7671	1967.77
E	3707.6604	3707.66
F	5552.4463	5552.45
G	1812.5534	1812.55
H	3072.6598	3072.66
I	4332.7665	4332.77

Length Function

Definition

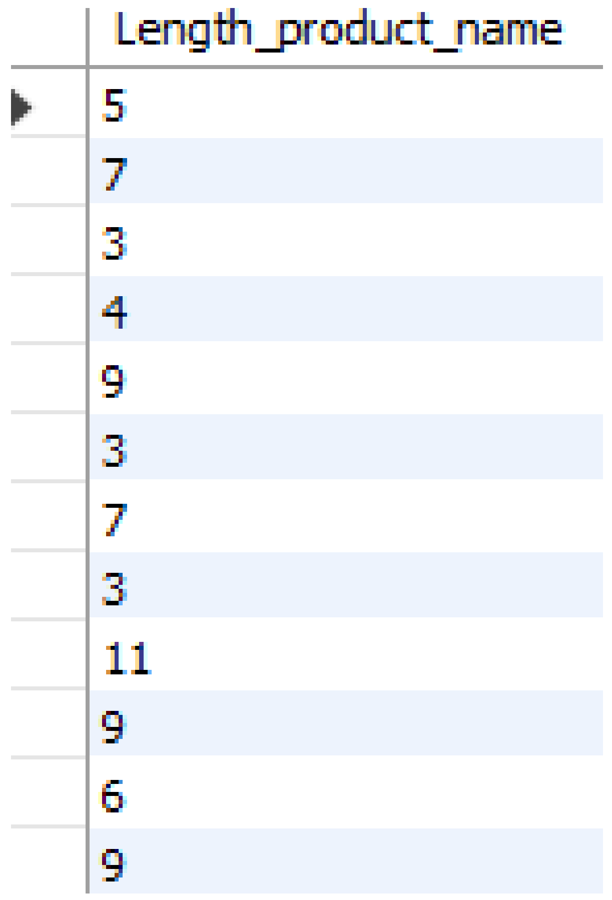
Length function returns the total length of the given column.

Syntax

```
SELECT LENGTH(column_name) FROM
table_name;
```

Length Example

Output



```
Length_product_name
5
7
3
4
9
3
7
3
11
9
6
9
```

Example

```
SELECT length(p_name) as
Length_product_name FROM product;
```

Format Function

Definition

Format function is used to format field value in the specified format.

Syntax

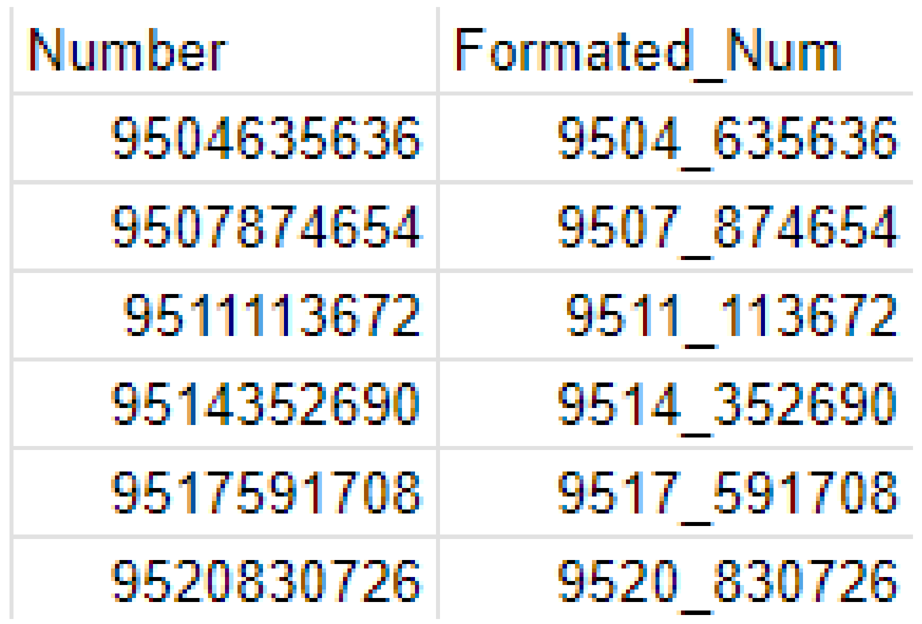
```
SELECT FORMAT(column_name,
format) FROM table_name;
```

Format Example

Example

```
SELECT FORMAT(Number,'####_######')
       AS Formated_Num;
```

Output



Number	Formated_Num
9504635636	9504_635636
9507874654	9507_874654
9511113672	9511_113672
9514352690	9514_352690
9517591708	9517_591708
9520830726	9520_830726

MID Function

Definition

MID function is used to retrieve the specified characters from the text field.

Syntax

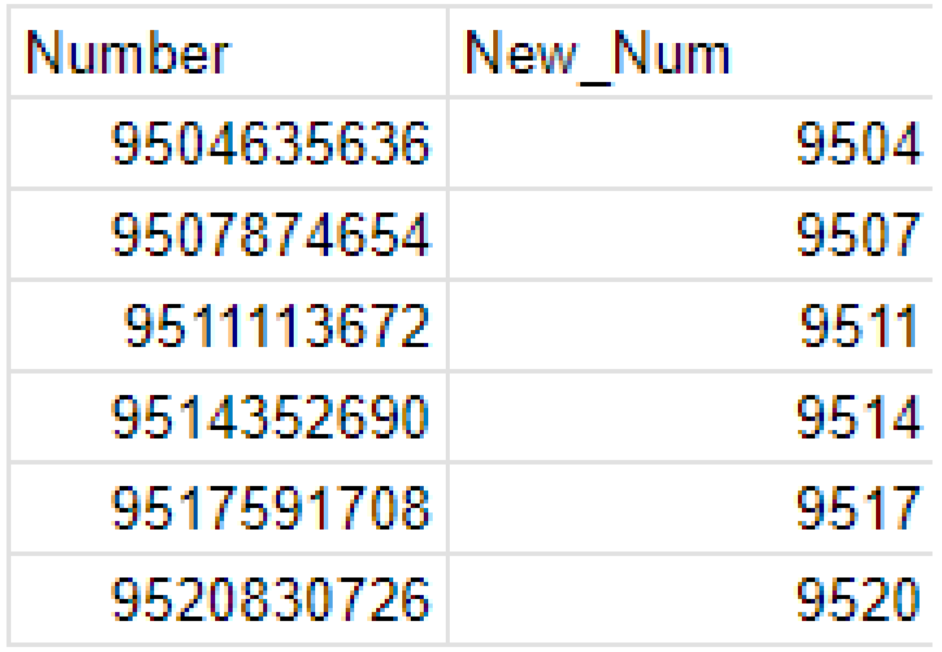
```
SELECT MID(column_name, start,
length) FROM table_name;
```

MID Example

Example

```
SELECT MID(Number,1,4) as New_Num
    FROM Contacts;
```

Output



Number	New_Num
9504635636	9504
9507874654	9507
9511113672	9511
9514352690	9514
9517591708	9517
9520830726	9520

NOW Function

Definition

NOW function is used to retrieve the system’s current date and time.

Syntax

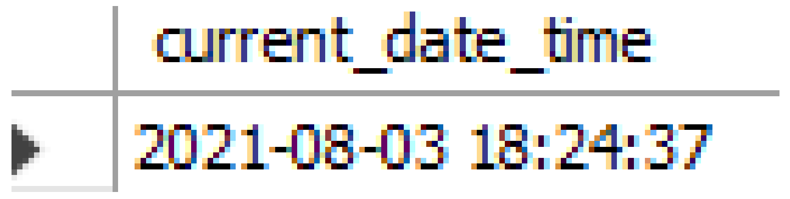
```
SELECT NOW()
```

NOW Example

Example

```
SELECT NOW() AS current_date_time
```

Output



```
current_date_time
2021-08-03 18:24:37
```

UCASE Function

Definition

UCASE function converts the given column to uppercase.

Syntax

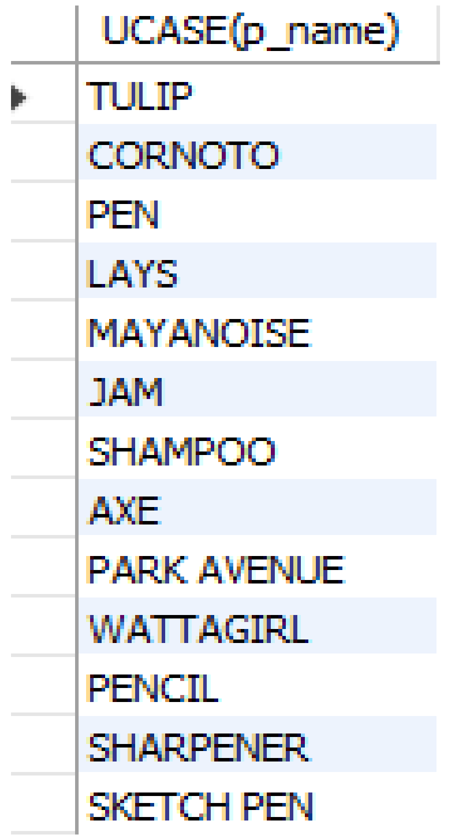
```
SELECT UCASE(column_name) FROM
table_name;
```

UCASE Example

Example

```
SELECT UCASE(p_name) FROM product
```

Output



```
UCASE(p_name)
TULIP
CORNOTO
PEN
LAYS
MAYANOISE
JAM
SHAMPOO
AXE
PARK AVENUE
WATTAGIRL
PENCIL
SHARPENER
SKETCH PEN
```

LCASE Function

Definition

LCASE function converts the given column to lowercase.

Syntax

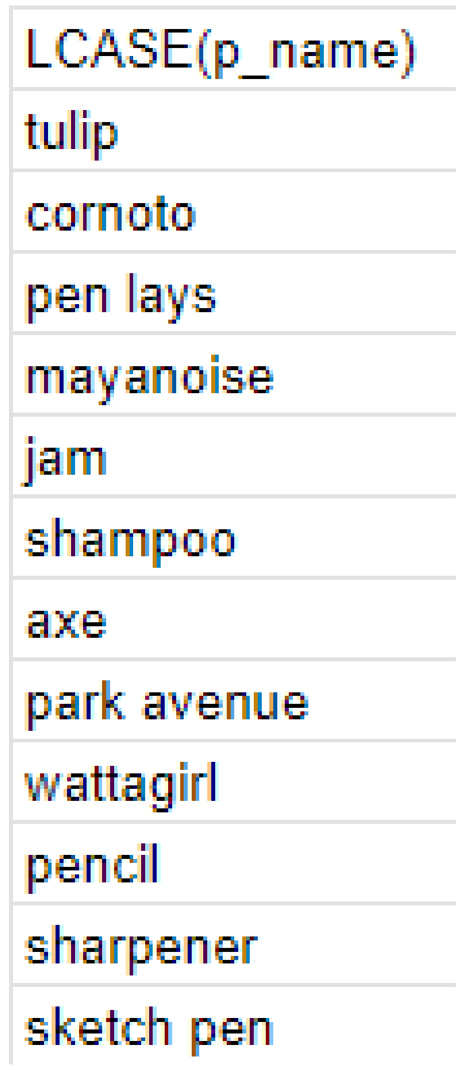
```
SELECT LCASE(column_name) FROM
table_name;
```

LCASE Example

Example

```
SELECT LCASE(p_name) FROM product
```

Output



```
LCASE(p_name)
tulip
cornoto
pen lays
mayanoise
jam
shampoo
axe
park avenue
wattagirl
pencil
sharpener
sketch pen
```

Problem Statement

Problem Scenario: You are working in a superstore as a junior database administrator. Your manager has asked you to find the order number from the order ID column for the better functionality of your store and to compare the order shipping and delivery dates.

Objective: You are required to extract the order number from the column **order ID** and list the shipping and delivery dates. Also, compare these dates with the present date.

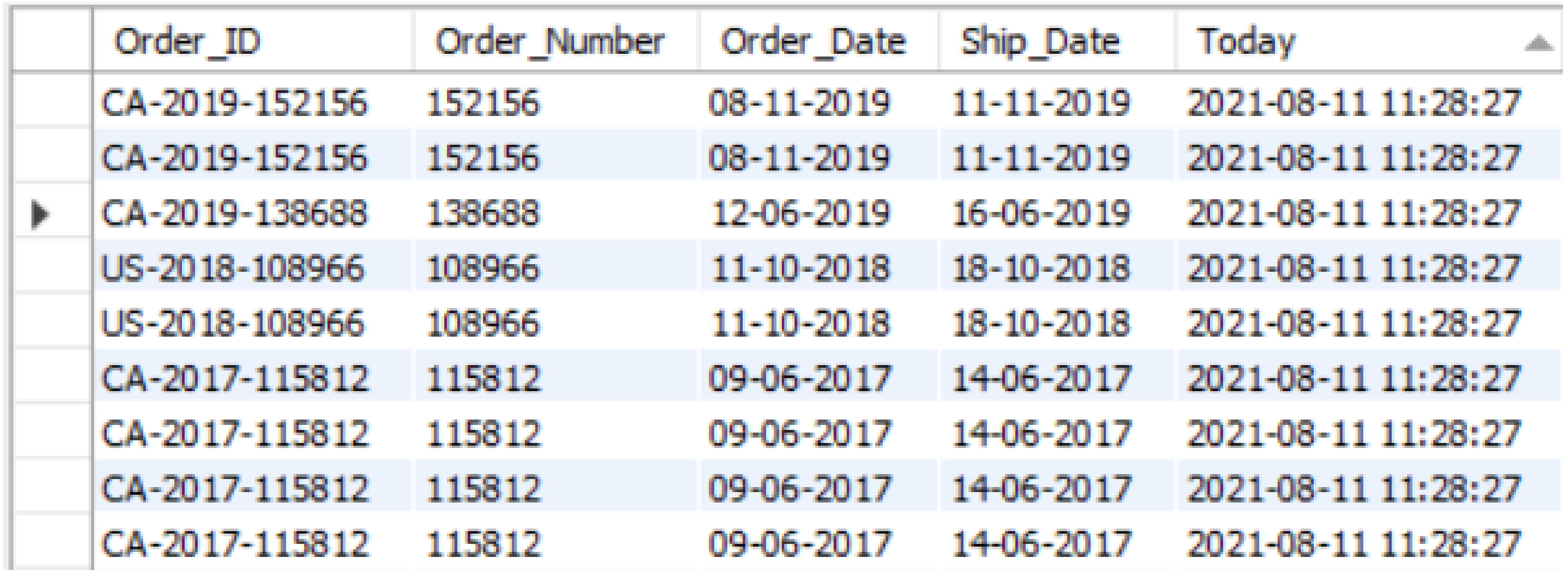
Solution

Query

```
SELECT Order_ID, mid(Order_ID,9,14) as Order_Number , Order_Date, Ship_Date, Now() as Today
FROM example.superstore;
```

Output

After executing the query, the order number from order ID, order date, ship date, and current date is being displayed.

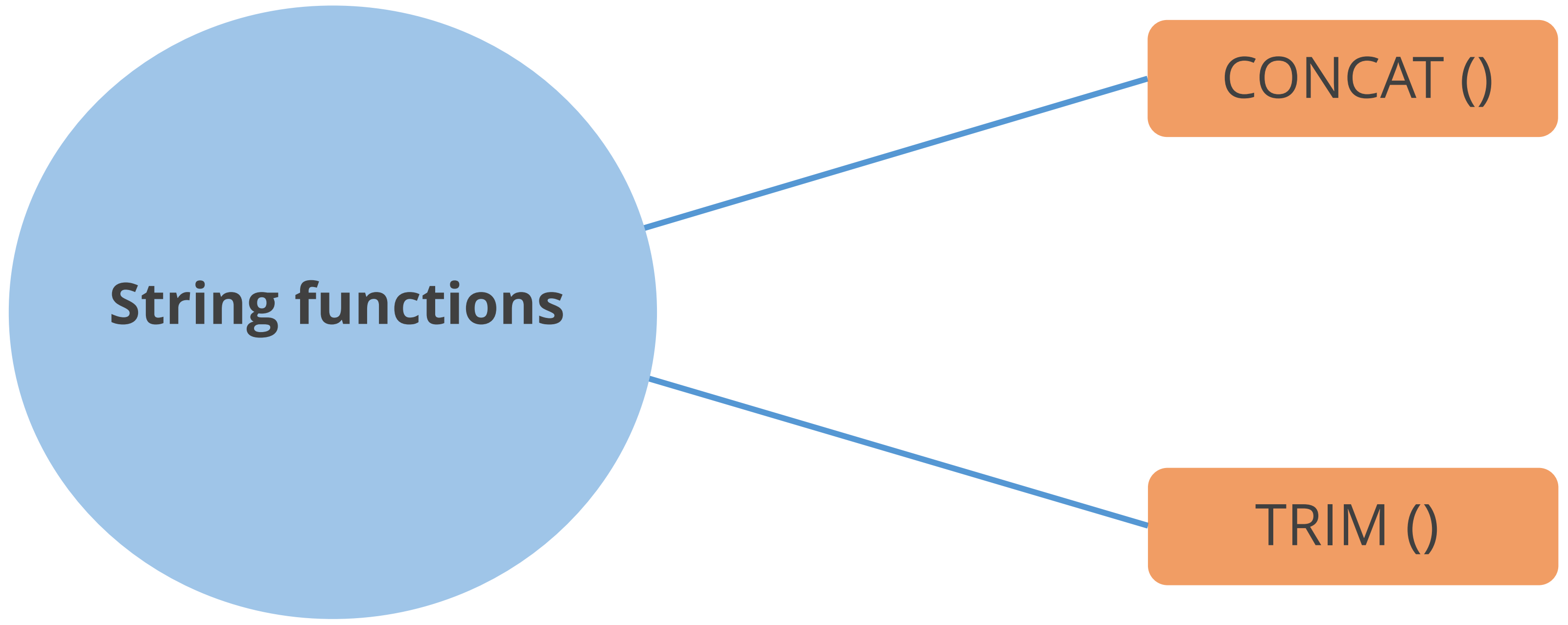


Order_ID	Order_Number	Order_Date	Ship_Date	Today
CA-2019-152156	152156	08-11-2019	11-11-2019	2021-08-11 11:28:27
CA-2019-152156	152156	08-11-2019	11-11-2019	2021-08-11 11:28:27
CA-2019-138688	138688	12-06-2019	16-06-2019	2021-08-11 11:28:27
US-2018-108966	108966	11-10-2018	18-10-2018	2021-08-11 11:28:27
US-2018-108966	108966	11-10-2018	18-10-2018	2021-08-11 11:28:27
CA-2017-115812	115812	09-06-2017	14-06-2017	2021-08-11 11:28:27
CA-2017-115812	115812	09-06-2017	14-06-2017	2021-08-11 11:28:27
CA-2017-115812	115812	09-06-2017	14-06-2017	2021-08-11 11:28:27
CA-2017-115812	115812	09-06-2017	14-06-2017	2021-08-11 11:28:27

String Functions

String Functions

The string functions are used for string manipulation.



Concat Function

Definition

Concat function is used to combine one or more characters into a single string.

Syntax

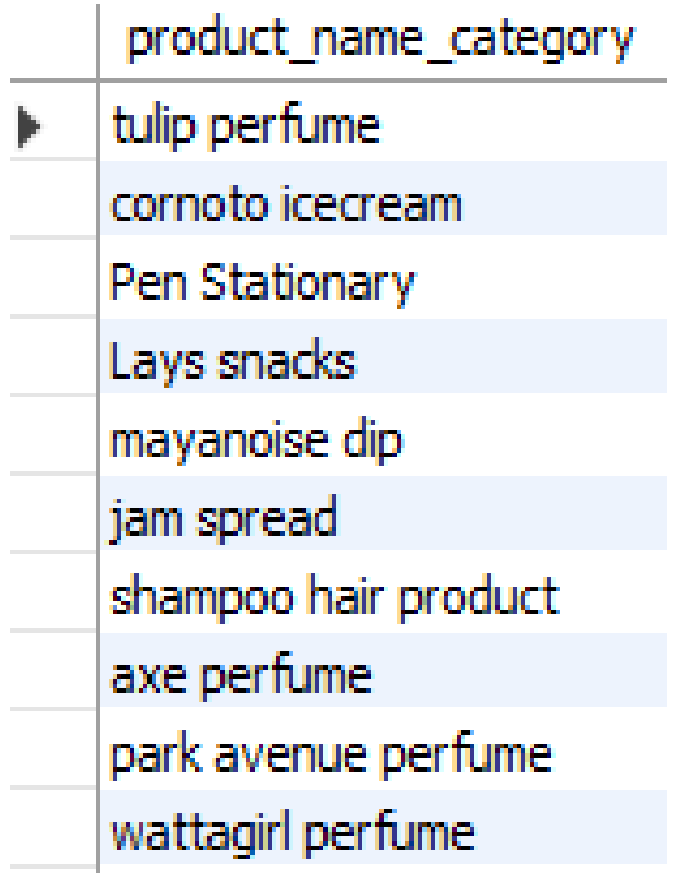
```
SELECT CONCAT (String 1, String 2, St
ring3.., String N)  FROM  table name;
```

Concat Example

Example

```
SELECT CONCAT(p_name,' ',category) AS
product_name_category FROM product
```

Output



```
product_name_category
tulip perfume
cornoto icecream
Pen Stationary
Lays snacks
mayanoise dip
jam spread
shampoo hair product
axe perfume
park avenue perfume
wattagirl perfume
```

Trim Function

Definition

Trim function is used to remove the spaces from both sides of the given string.

Syntax

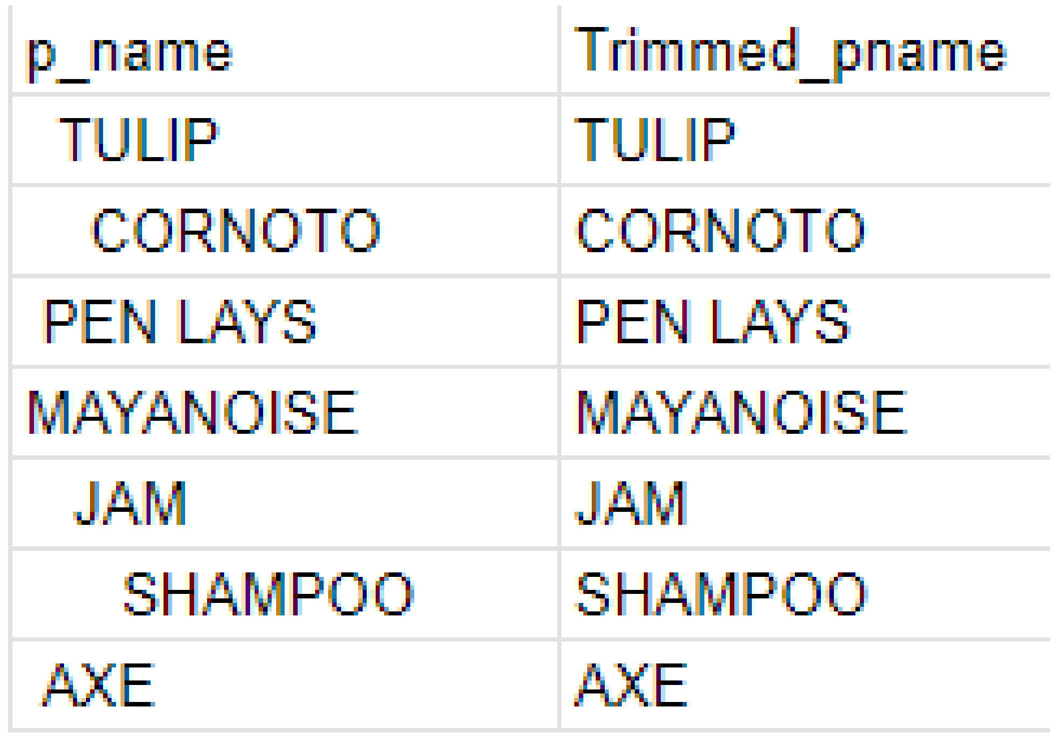
```
SELECT  TRIM  (String  1)   FROM
table name;
```

Trim Example

Example

```
SELECT  TRIM(BOTH ' ` pname) AS
Trimmed_pname
FROM product;
```

Output



p_name	Trimmed_pname
TULIP	TULIP
CORNOTO	CORNOTO
PEN LAYS	PEN LAYS
MAYANOISE	MAYANOISE
JAM	JAM
SHAMPOO	SHAMPOO
AXE	AXE

Problem Statement

Problem Scenario: You are working in a superstore as a junior database administrator. Your manager has asked you to retrieve the list of all the customer addresses to send them a personalized invite as a marketing strategy for an upcoming sale in the store.

Objective: You are required to display the customer's name, city, state, and postal code from the superstore table in a single column **address**. Also, count the length of the customer's **name** and convert it into lowercase and **state** into uppercase, respectively.

Solution

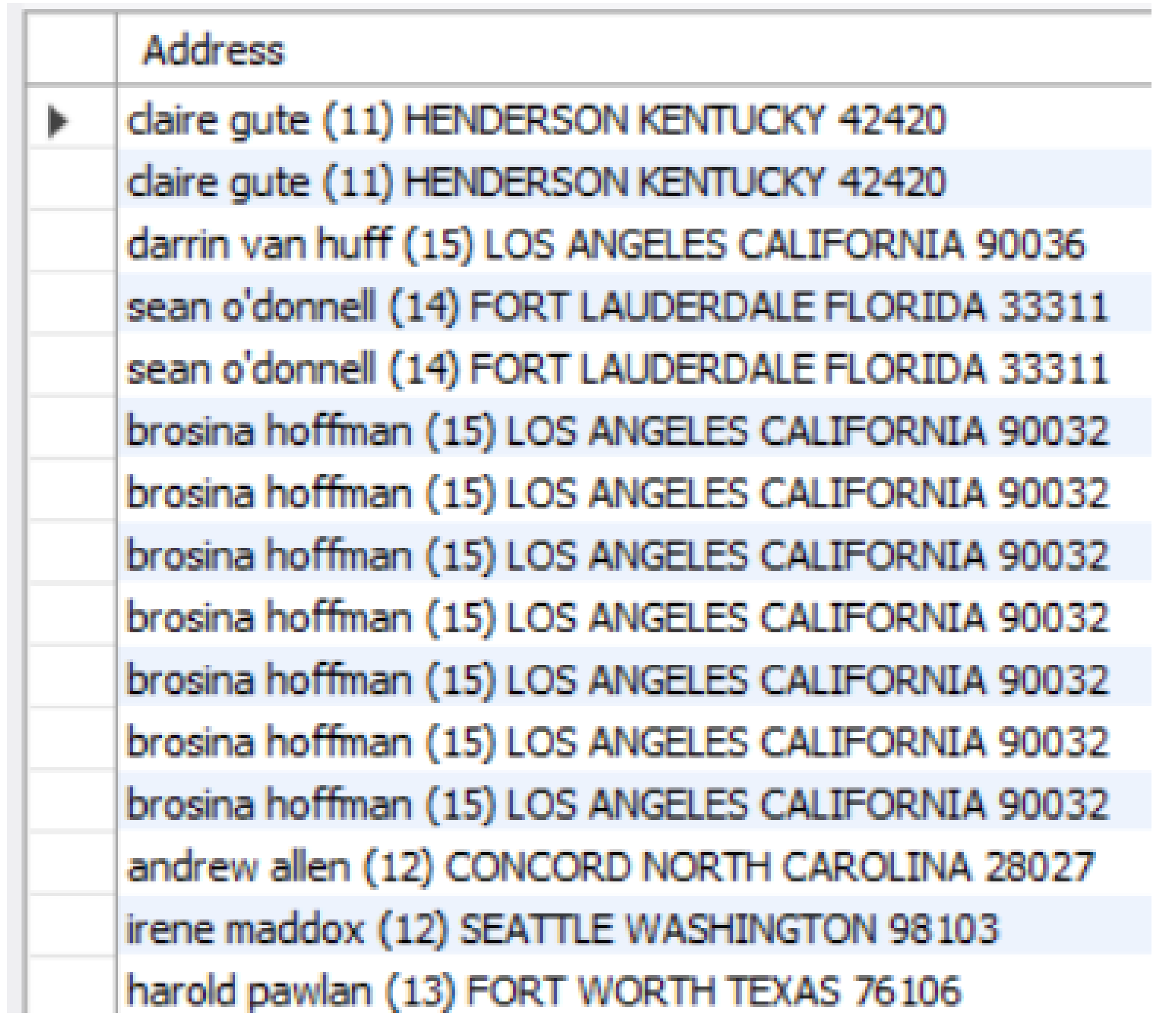
Query

```
SELECT Concat(lcase(Customer_Name),' ','(' , length(Customer_Name), ')', ' ', ucase(City),' ',
ucase(State),' ', Postal_Code) as Address

FROM example.superstore;
```

Output

After executing the query, the customer's name, city, state, and postal code are collectively shown as an address.



```
Address
claire gute (11) HENDERSON KENTUCKY 42420
claire gute (11) HENDERSON KENTUCKY 42420
darrin van huff (15) LOS ANGELES CALIFORNIA 90036
sean o'donnell (14) FORT LAUDERDALE FLORIDA 33311
sean o'donnell (14) FORT LAUDERDALE FLORIDA 33311
brosina hoffman (15) LOS ANGELES CALIFORNIA 90032
brosina hoffman (15) LOS ANGELES CALIFORNIA 90032
brosina hoffman (15) LOS ANGELES CALIFORNIA 90032
brosina hoffman (15) LOS ANGELES CALIFORNIA 90032
brosina hoffman (15) LOS ANGELES CALIFORNIA 90032
brosina hoffman (15) LOS ANGELES CALIFORNIA 90032
brosina hoffman (15) LOS ANGELES CALIFORNIA 90032
andrew allen (12) CONCORD NORTH CAROLINA 28027
irene maddox (12) SEATTLE WASHINGTON 98103
harold pawlan (13) FORT WORTH TEXAS 76106
```

Problem Statement

Problem Scenario: As the junior database administrator, your manager has asked you to format the customer ID column and remove the extra spaces.

Objective: You are required to format the customer ID column and remove the extra spaces.

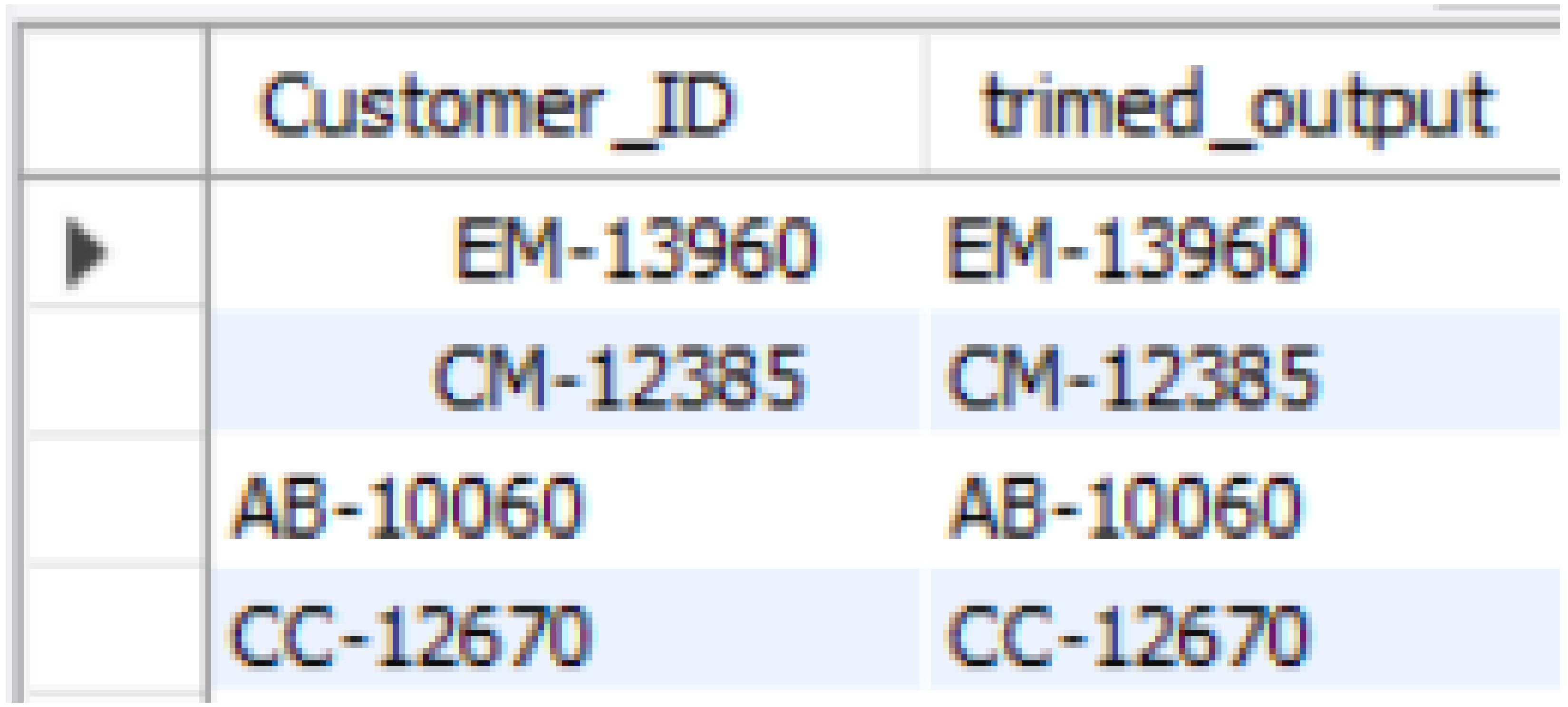
Solution

Query

```
SELECT Customer_ID, TRIM(Customer_ID) as trimed_output
FROM example.return_products;
```

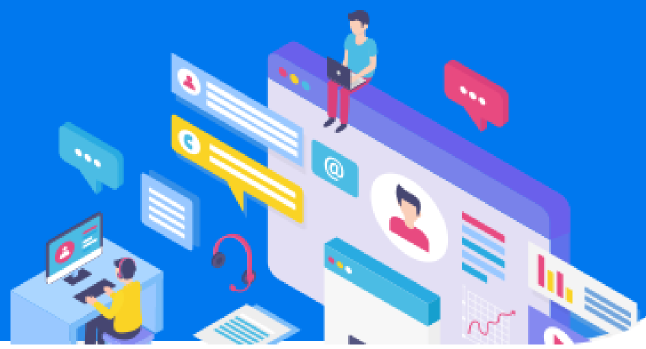
Output

After executing the query, we can eliminate the excess white spaces from the customer ID column.



Customer_ID	trimed_output
EM-13960	EM-13960
CM-12385	CM-12385
AB-10060	AB-10060
CC-12670	CC-12670

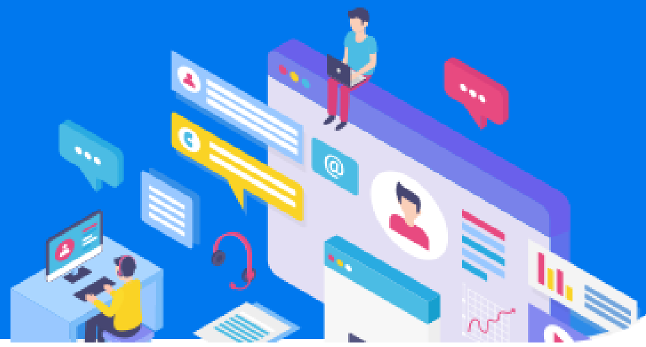
Assisted Practice: String Function



Duration: 15 min

Problem Statement: As the HR of your organization, you are expected to wish Merry Christmas to everyone. List down the **full names** of all the employees in uppercase using string functions.

Assisted Practice: String Function



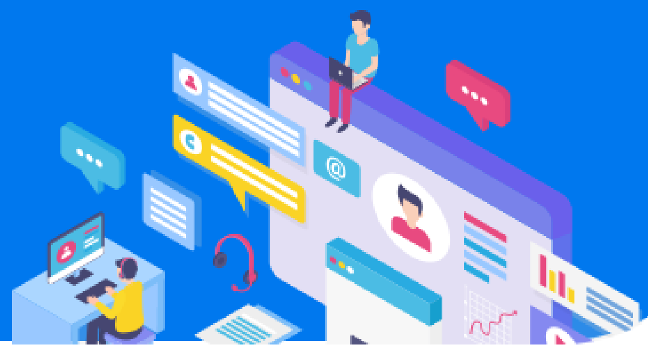
Steps to be performed:

1. Create a database named **example**, then make a table named **candidates**, that has a column named **FirstName** and **LastName**.

TABLE CREATION

```
CREATE TABLE `example`.`candidates` (
`FirstName` VARCHAR(255) NOT NULL,
`LastName` VARCHAR(255) NOT NULL);
```

Assisted Practice: String Function

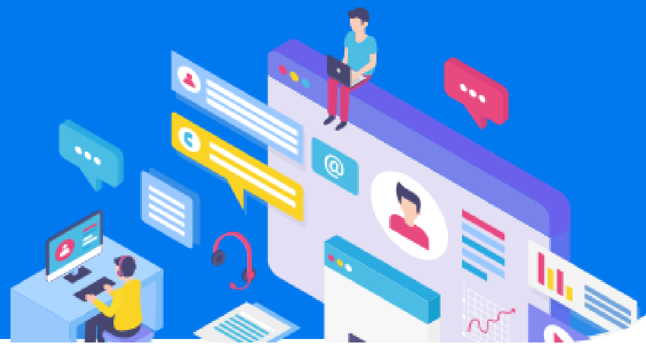


2. Insert values in the **candidates** table.

VALUE INSERTION

```
INSERT INTO `example`.`candidates` (`FirstName`, `LastName`)
VALUES ('James', 'Smith'),
('Maria ', 'Gracia'),
('Michael ', 'Rodriguez'),
('Robert ', 'Johnson'),
('David', 'Hernandez');
```

Assisted Practice: String Function



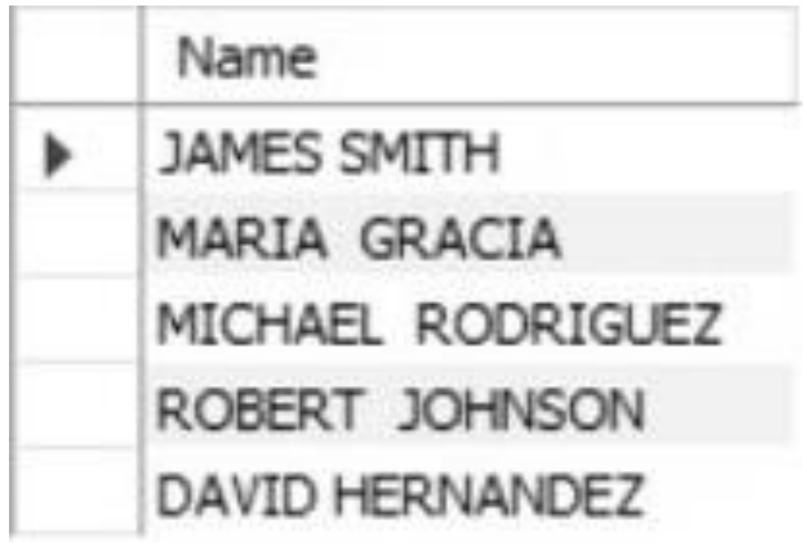
3. Write a query to combine **FirstName** and **LastName** into a single string in a new column named **Name**.

QUERY

```
SELECT CONCAT(UCASE(FirstName)," ",UCASE(LastName)) AS Name
FROM example.candidates;
```

Assisted Practice: Lab Output

Output:

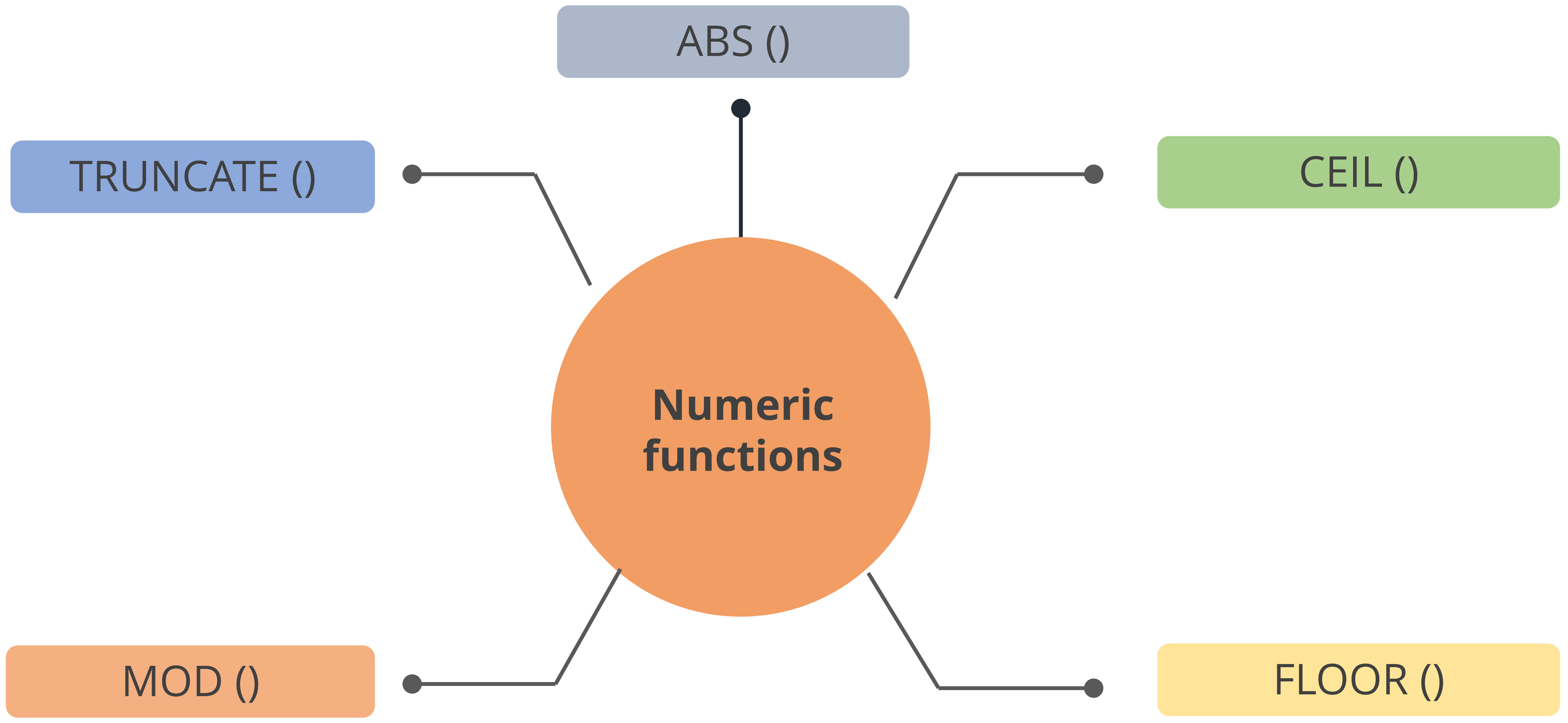


	Name
▶	JAMES SMITH
	MARIA GRACIA
	MICHAEL RODRIGUEZ
	ROBERT JOHNSON
	DAVID HERNANDEZ

Numeric Functions

Numeric Functions

The numeric functions are used to perform numeric manipulation or mathematical operations.



ABS Function

Definition

ABS function is used to return the absolute value of a given number.

Syntax

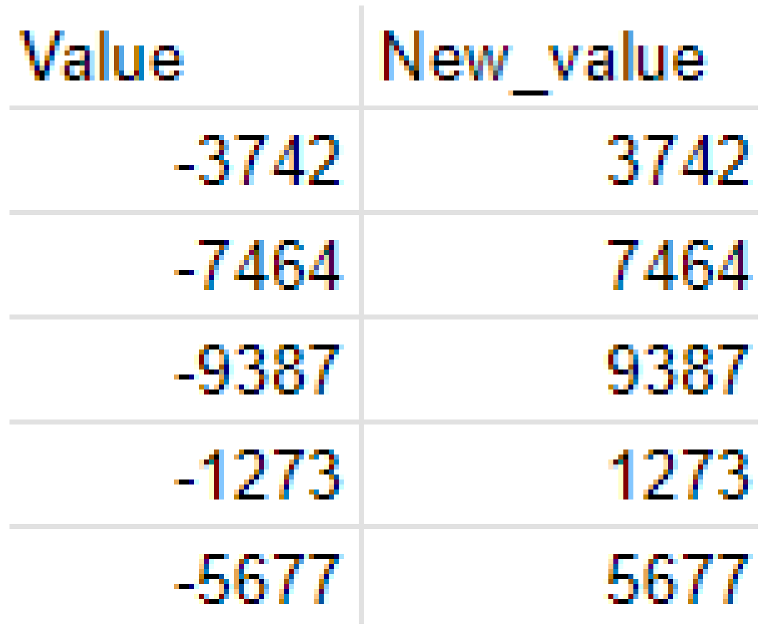
```
SELECT ABS (VALUE);
```

ABS Example

Example

```
SELECT ABS(Value) AS New_value
```

Output



Value	New_value
-3742	3742
-7464	7464
-9387	9387
-1273	1273
-5677	5677

Ceil Function

Definition

Ceil function returns the smallest integer value that is greater than or equal to the given number.

Syntax

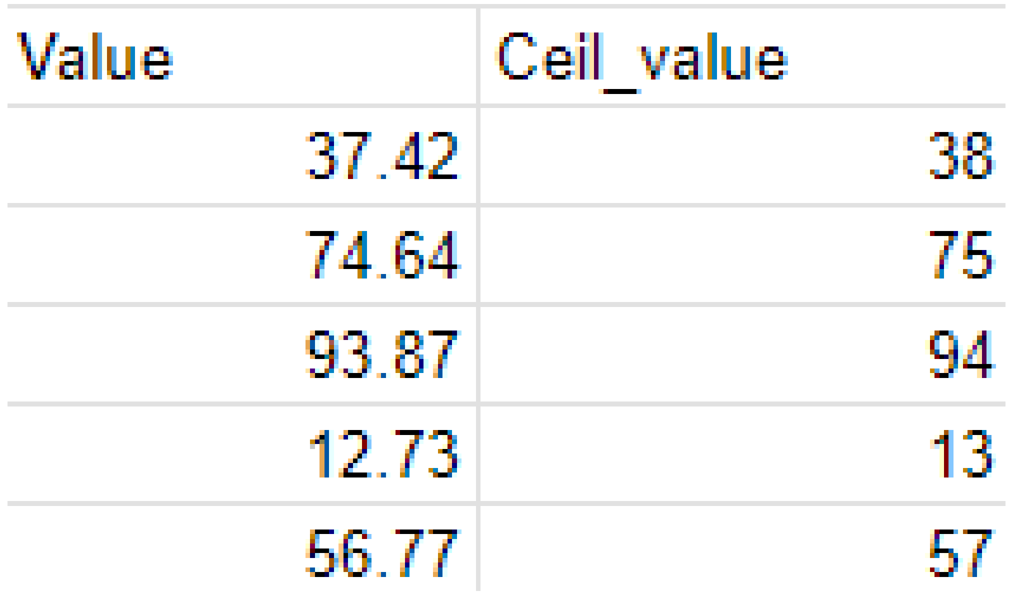
```
SELECT CEIL(VALUE);
```

Ceil Example

Example

```
SELECT CEIL(Value) AS Ceil_value
```

Output



Value	Ceil_value
37.42	38
74.64	75
93.87	94
12.73	13
56.77	57

Floor Function

Definition

Floor function returns the largest integer value that is less than or equal to the given number.

Syntax

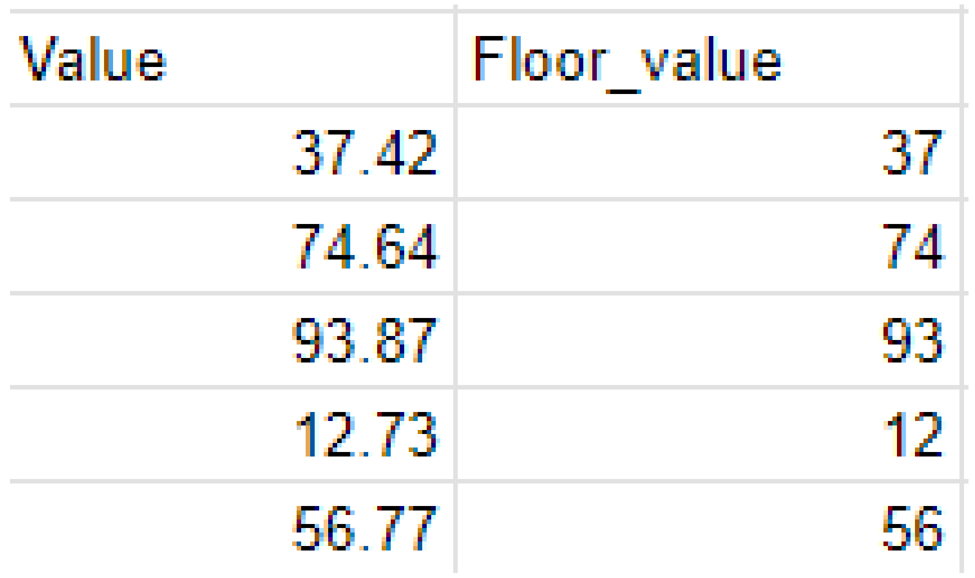
```
SELECT FLOOR(VALUE);
```

Floor Example

Example

```
SELECT FLOOR(Value) AS Floor_value
```

Output



Value	Floor_value
37.42	37
74.64	74
93.87	93
12.73	12
56.77	56

Truncate Function

Definition

Truncate function is used to truncate a number to the specified number of decimal places.

Syntax

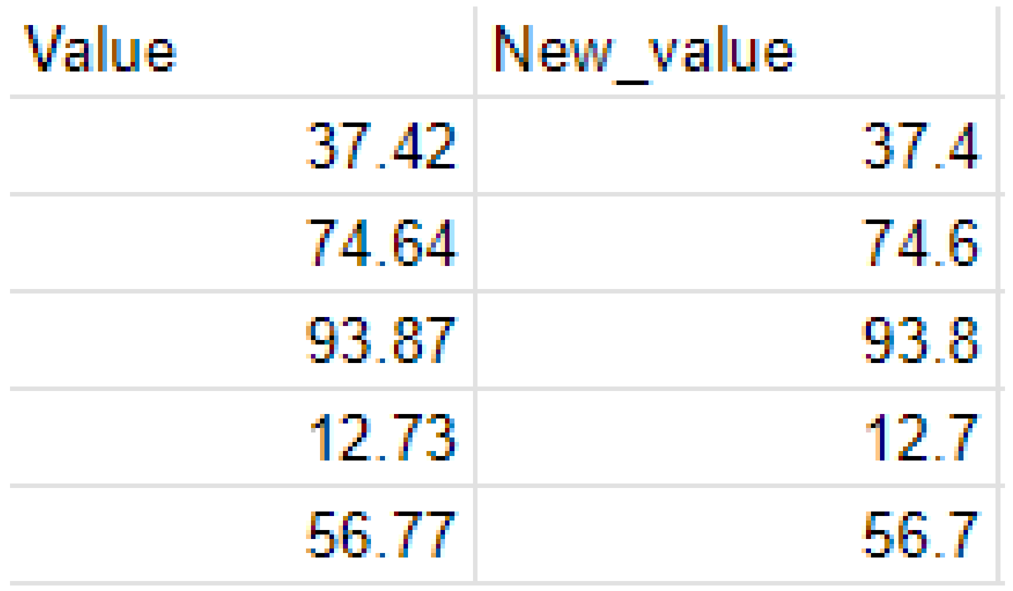
```
SELECT TRUNCATE (VALUE,DECIMALS);
```

Truncate Example

Example

```
SELECT TRUNCATE(Value,1) AS New_value
```

Output



Value	New_value
37.42	37.4
74.64	74.6
93.87	93.8
12.73	12.7
56.77	56.7

MOD Function

Definition

MOD function returns the remainder of a number by dividing it with another number.

Syntax

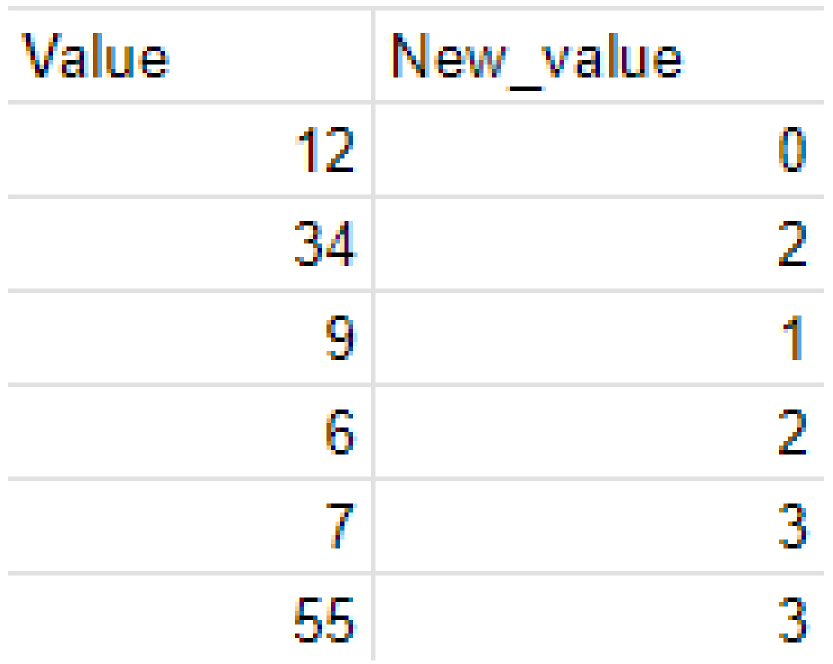
```
SELECT MOD (VALUE1 , VALUE2);
```

MOD Example

Example

```
SELECT MOD(Value,4) AS New_value
```

Output



Value	New_value
12	0
34	2
9	1
6	2
7	3
55	3

Problem Statement

Problem Scenario: You are working in a superstore as a junior database administrator. Your manager has asked you to perform different operations on the sales column in order to obtain the highest profit so that the management can plan the next quarter accordingly.

Objective: The data that you received from the profit column is in decimals. You are required to perform mathematical and scaler operations using different functions to manipulate and compare the profit generated.

Solution

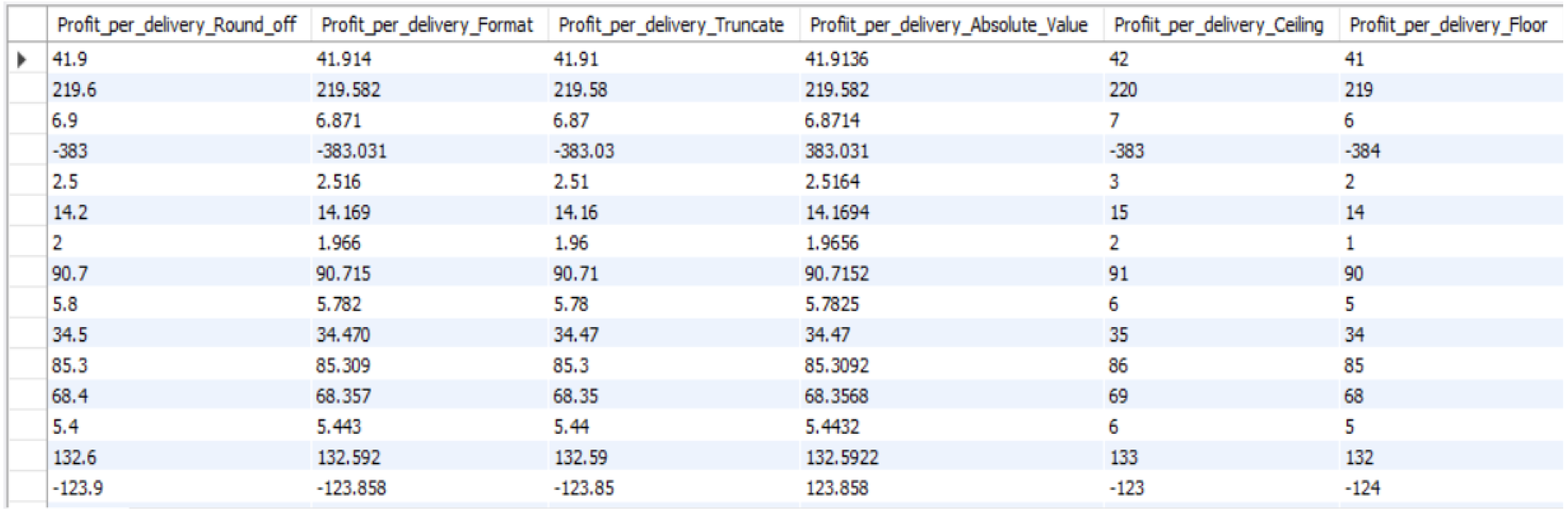
Query

```
SELECT Round(Profit, 1) as Profit_per_delivery_Round_off, Format(Profit, 3) as
Profit_per_delivery_Format, Truncate(Profit,2) as Profit_per_delivery_Truncate, ABS(Profit) as
Profiit_per_delivery_Absolute_Value, Ceil(Profit) as Profiit_per_delivery_Ceiling, Floor(Profit)
as Profiit_per_delivery_Floor

FROM example.superstore;
```

Output

The following output is generated after executing the query:



Profit_per_delivery_Round_off	Profit_per_delivery_Format	Profit_per_delivery_Truncate	Profit_per_delivery_Absolute_Value	Profit_per_delivery_Ceiling	Profit_per_delivery_Floor
41.9	41.914	41.91	41.9136	42	41
219.6	219.582	219.58	219.582	220	219
6.9	6.871	6.87	6.8714	7	6
-383	-383.031	-383.03	383.031	-383	-384
2.5	2.516	2.51	2.5164	3	2
14.2	14.169	14.16	14.1694	15	14
2	1.966	1.96	1.9656	2	1
90.7	90.715	90.71	90.7152	91	90
5.8	5.782	5.78	5.7825	6	5
34.5	34.470	34.47	34.47	35	34
85.3	85.309	85.3	85.3092	86	85
68.4	68.357	68.35	68.3568	69	68
5.4	5.443	5.44	5.4432	6	5
132.6	132.592	132.59	132.5922	133	132
-123.9	-123.858	-123.85	123.858	-123	-124

Problem Statement

Problem Scenario: As the junior database administrator, your manager has asked you to check if years of experience is odd or even.

Objective: You are required to calculate the experience MOD 2.

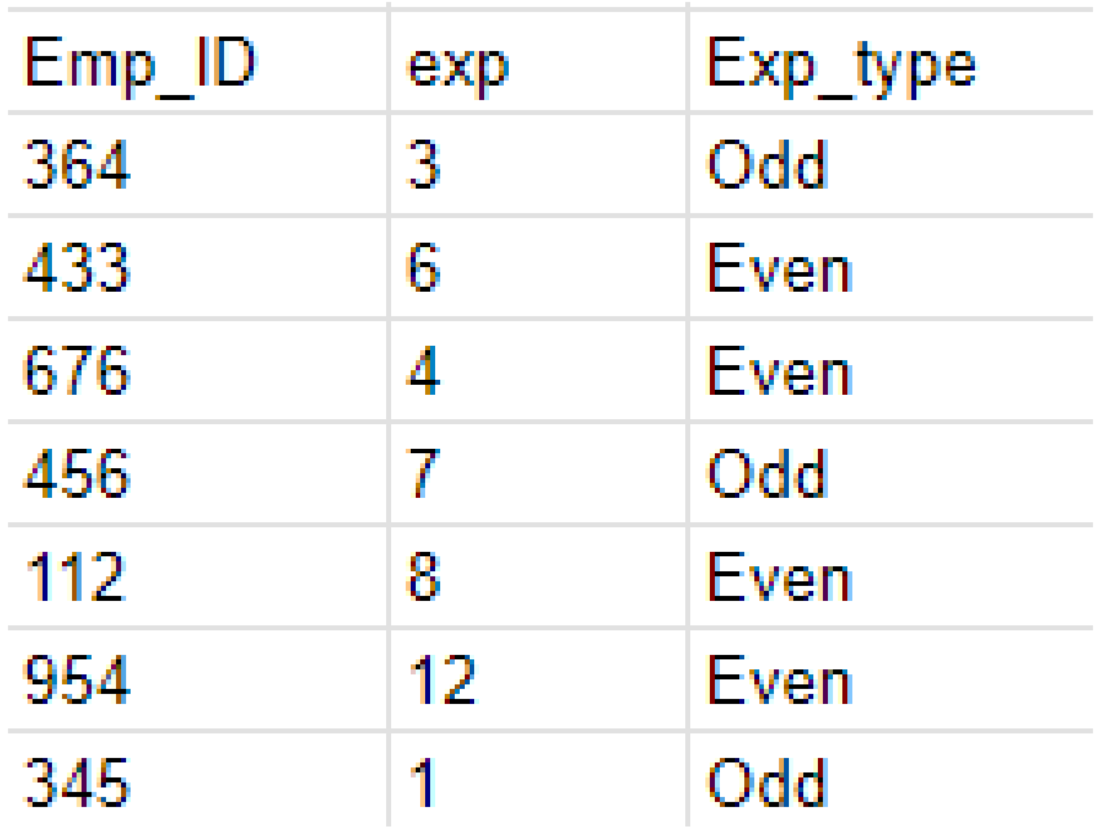
Solution

Query

```
SELECT employee_id, exp,
    CASE
        WHEN MOD(exp, 2) = 0 THEN 'Even'
        ELSE 'Odd'
    END AS Exp_type
FROM employees;
```

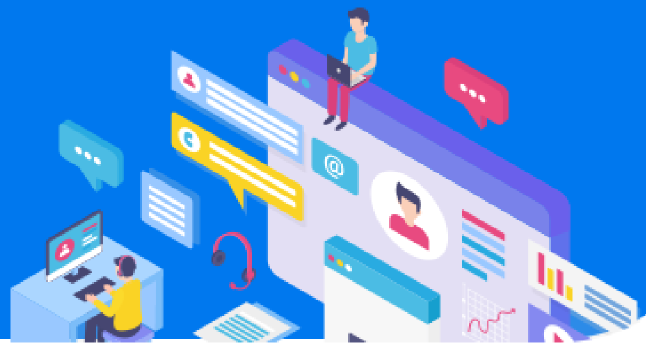
Output

After executing the query, you can check if the experience is in odd or even years.



Emp_ID	exp	Exp_type
364	3	Odd
433	6	Even
676	4	Even
456	7	Odd
112	8	Even
954	12	Even
345	1	Odd

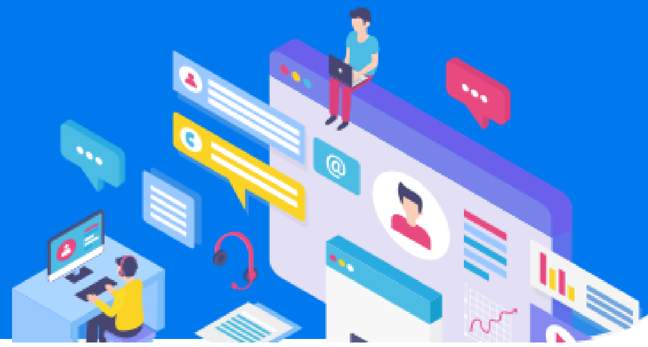
Assisted Practice: Numeric Function



Duration: 20 min

Problem Statement: You need to understand the approximate and actual profit from your shop's daily transaction ledger and decide to *round off* the **Amount** up to 0 and 2 decimal places. Also, apply *ceiling* and *floor* on the **Amount** respectively to understand the differences.

Assisted Practice: Numeric Function



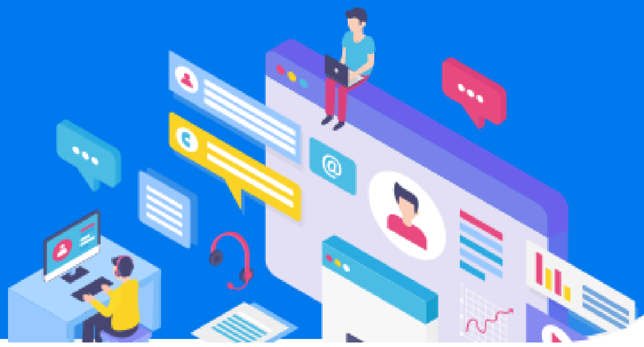
Steps to be performed:

1. Create a database named **example** and then make a table named **bill**, that has a column named **S.no.**, **Name** and **Amount.** Also, assign **S.no.** as the **primary key**.

TABLE CREATION

```
CREATE TABLE `example'.' bill` (
  `S.no.` INT NOT NULL,
  `Name` VARCHAR(255) NOT NULL,
  `Amount` DECIMAL NOT NULL,
  PRIMARY KEY (`S.no.`));
```

Assisted Practice: Numeric Function

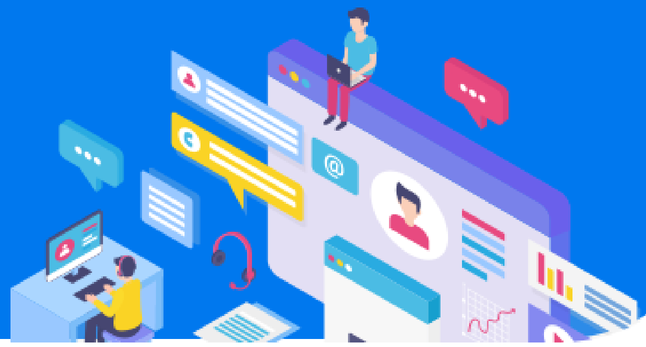


2. Insert values in the **bill** table.

VALUE INSERTION

```
INSERT INTO `example`.`bill` (`S.no.`, `Name`, `Amount`)
VALUES ('1', 'Oliver', '2753.3491’),
('2', 'George', '2532.4082’),
('3', 'Arthur', '2021.5541’),
('4', 'Muhammad', '1934.9436’),
('5', 'Leo', '1846.2651’),
('6', 'Jack', '1244.0034’),
('7', 'Harry', '1187.0017');
```

Assisted Practice: Numeric Function



3. Write a query to perform **round()** function up to 0 and 2 decimal places and perform **ceil()** and **floor()** functions.

QUERY

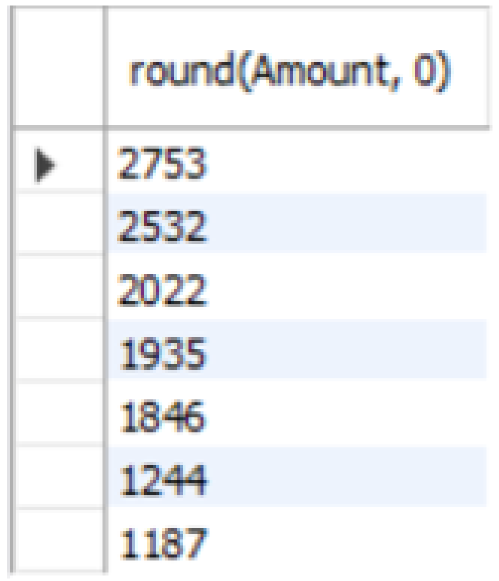
```
1.SELECT round(Amount, 0)
FROM example.bill;
```

```
2.SELECT round(Amount, 2)
 FROM example.bill;
```

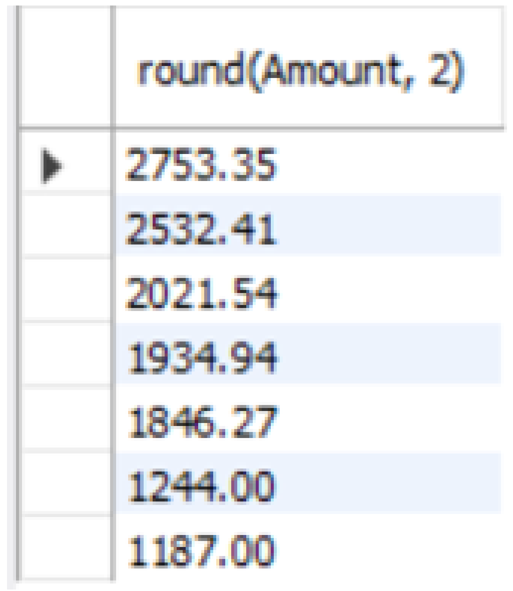
```
3.SELECT ceil(Amount)
FROM example.bill;
```

```
4.SELECT floor(Amount)
 FROM example.bill;
```

Assisted Practice: Lab Output

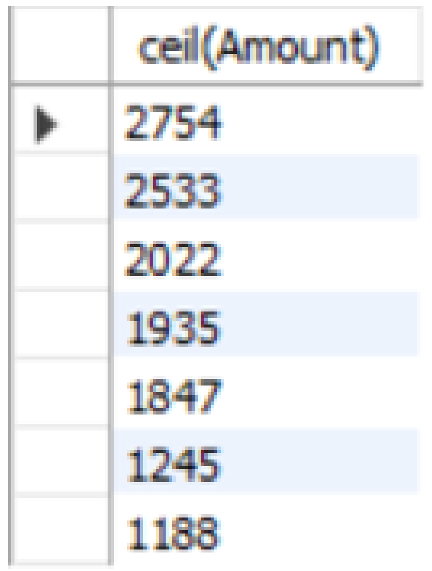


round(Amount, 0)
2753
2532
2022
1935
1846
1244
1187

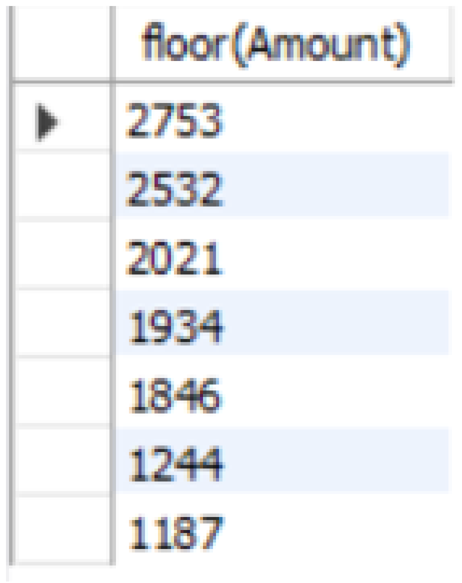


round(Amount, 2)
2753.35
2532.41
2021.54
1934.94
1846.27
1244.00
1187.00

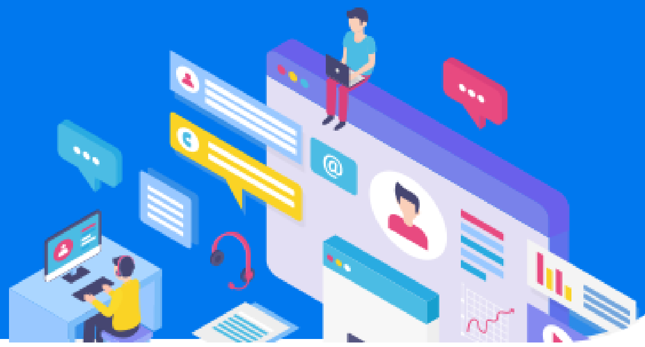
Assisted Practice: Lab Output



```
ceil(Amount)
2754
2533
2022
1935
1847
1245
1188
```



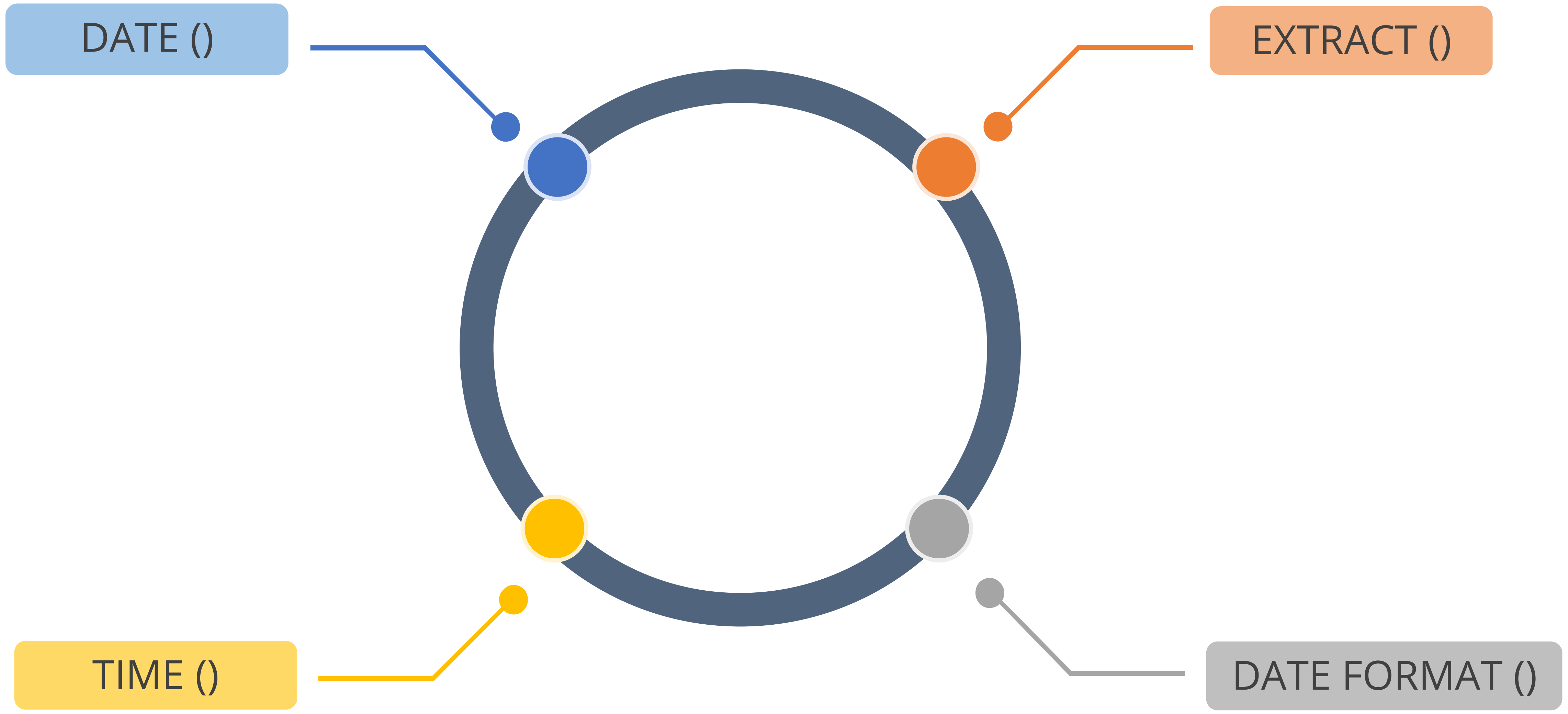
```
floor(Amount)
2753
2532
2021
1934
1846
1244
1187
```



Date and Time Functions

Date and Time Functions

It helps to extract the time, date, and year as per the requirement.



Date Function

Definition

Date function extracts the date part from the given expression.

Syntax

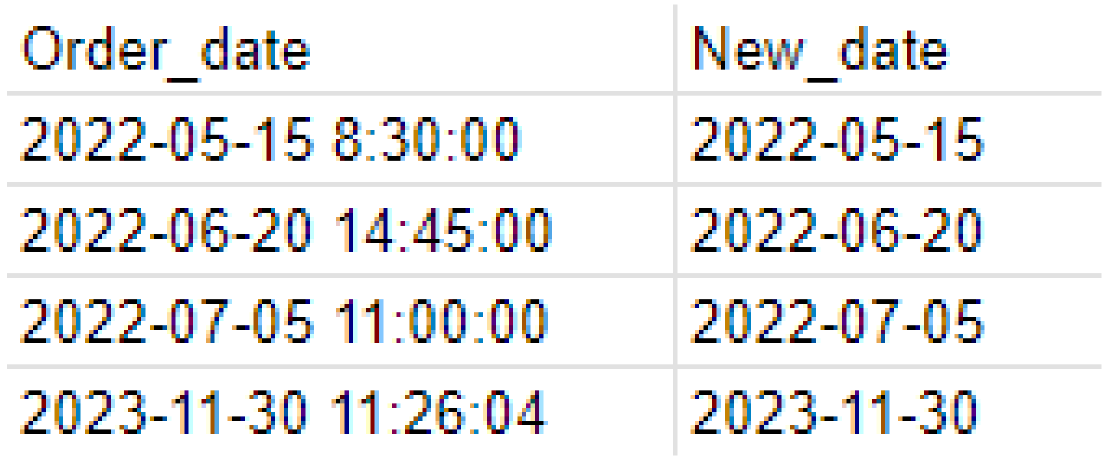
```
select date('expression');
```

Date Example

Example

```
SELECT DATE(Order_date) AS New_date
```

Output



Order_date	New_date
2022-05-15 8:30:00	2022-05-15
2022-06-20 14:45:00	2022-06-20
2022-07-05 11:00:00	2022-07-05
2023-11-30 11:26:04	2023-11-30

Time Function

Definition

Time function extracts the time from the given expression.

Syntax

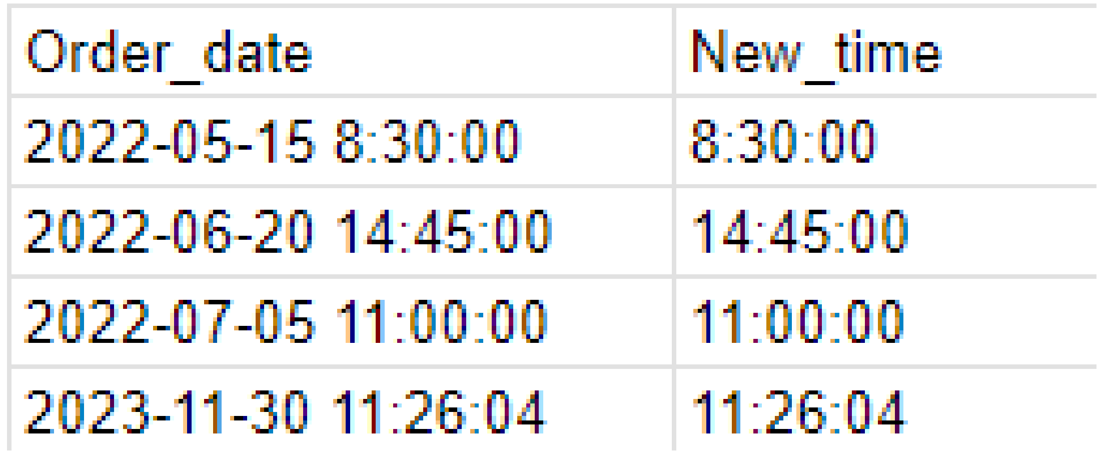
```
select time(expression);
```

Time Example

Example

```
SELECT TIME(Order_time) AS New_time
```

Output



Order_date	New_time
2022-05-15 8:30:00	8:30:00
2022-06-20 14:45:00	14:45:00
2022-07-05 11:00:00	11:00:00
2023-11-30 11:26:04	11:26:04

Extract Function

Definition

Extract function extracts the date, month, year, and time from the given expression.

Syntax

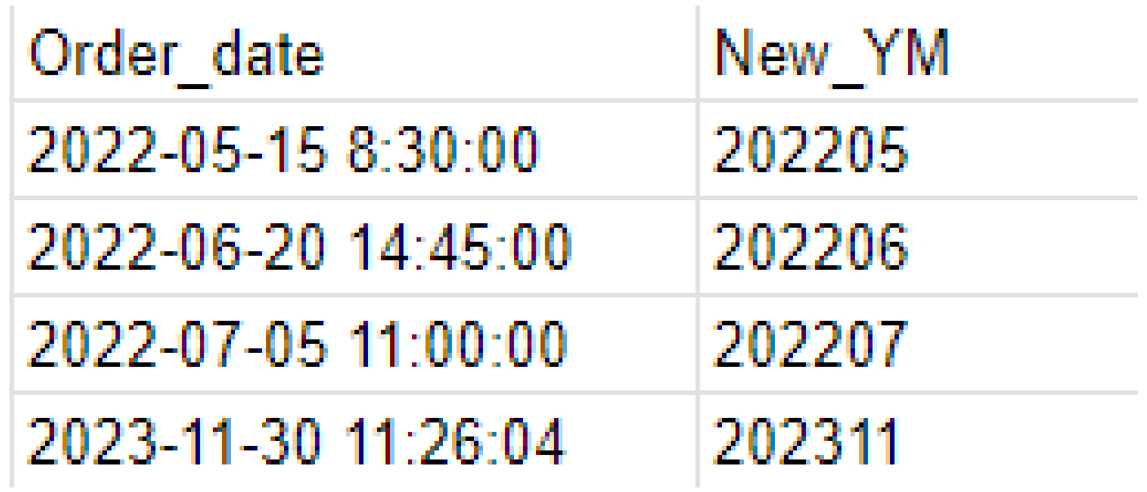
```
EXTRACT(part FROM expression)
```

Extract Example

Example

```
SELECT EXTRACT(YEAR_MONTH FROM
Order_date) AS New_YM;
```

Output



Order_date	New_YM
2022-05-15 8:30:00	202205
2022-06-20 14:45:00	202206
2022-07-05 11:00:00	202207
2023-11-30 11:26:04	202311

Date Format Function

Definition

Date format function returns the date in a specified format.

Syntax

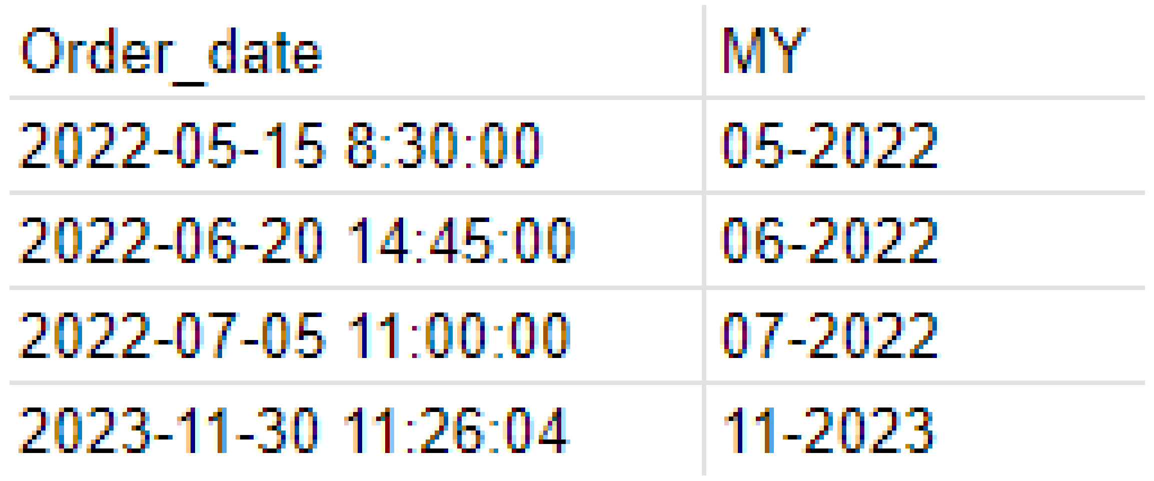
```
select date_format(date, format_mask)
```

Date Format Example

Example

```
SELECT DATE_FORMAT(Order_date, '%M:%Y')
AS MY;
```

Output



Order_date	MY
2022-05-15 8:30:00	05-2022
2022-06-20 14:45:00	06-2022
2022-07-05 11:00:00	07-2022
2023-11-30 11:26:04	11-2023

Problem Statement

Problem Scenario: You are working in a superstore as a junior database administrator. Your manager has asked you to find the date, time, and year of the returned products while listing them in the American standard format.

Objective: You are required to extract date, time, and year from the **Return_Date_Time** column of the table **Return product** and list the date in American format.

Solution

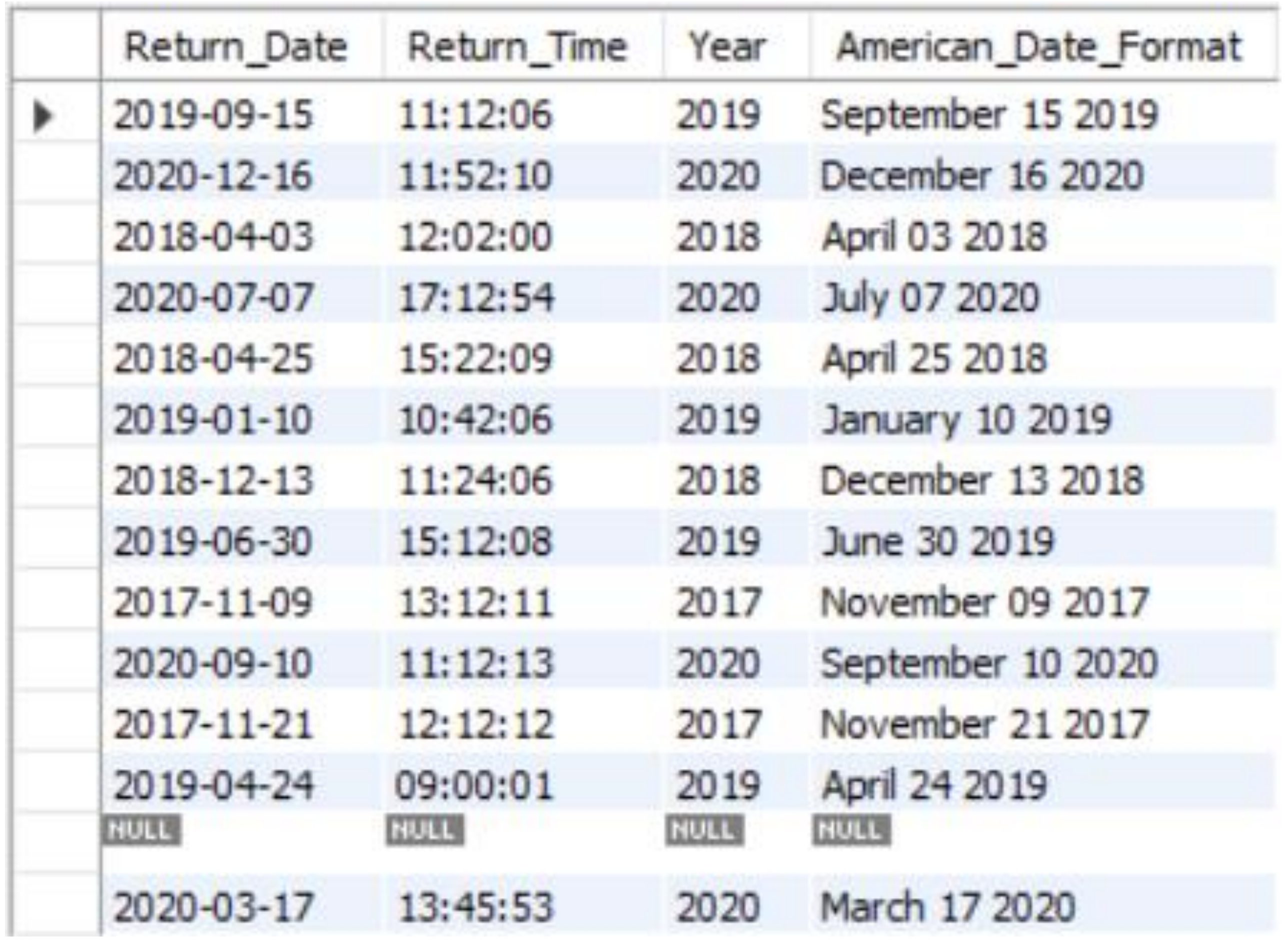
Query

```
SELECT Date(Return_Date_Time) as Return_Date, Time(Return_Date_Time) as Return_Time,
EXTRACT(YEAR FROM Return_Date_Time) AS Year, DATE_FORMAT(Return_Date_Time, '%M %d %Y') as
American_Date_Format

FROM example.return_products;
```

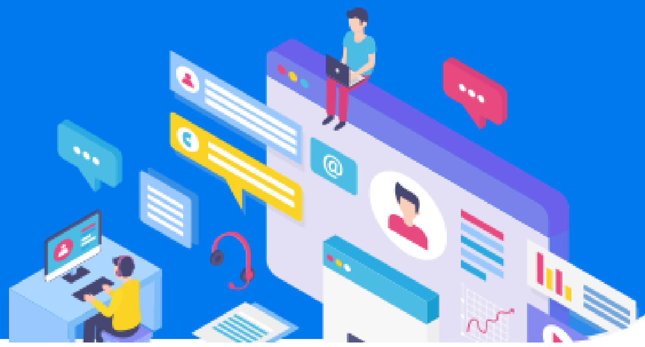
Output

After executing the query, return date is converted into standard American date format.



Return_Date	Return_Time	Year	American_Date_Format
2019-09-15	11:12:06	2019	September 15 2019
2020-12-16	11:52:10	2020	December 16 2020
2018-04-03	12:02:00	2018	April 03 2018
2020-07-07	17:12:54	2020	July 07 2020
2018-04-25	15:22:09	2018	April 25 2018
2019-01-10	10:42:06	2019	January 10 2019
2018-12-13	11:24:06	2018	December 13 2018
2019-06-30	15:12:08	2019	June 30 2019
2017-11-09	13:12:11	2017	November 09 2017
2020-09-10	11:12:13	2020	September 10 2020
2017-11-21	12:12:12	2017	November 21 2017
2019-04-24	09:00:01	2019	April 24 2019
NULL	NULL	NULL	NULL
2020-03-17	13:45:53	2020	March 17 2020

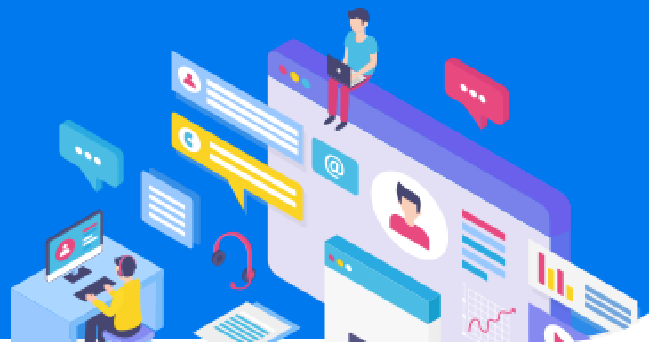
Assisted Practice: Functions One



Duration: 20 mins

Problem statement: As an analyst in Audio Hub Ltd., you've been asked to report the number of albums released in different years and report which day of the month has the most releases and which category label has the most sales.

Assisted Practice: Functions One



Steps to be performed:

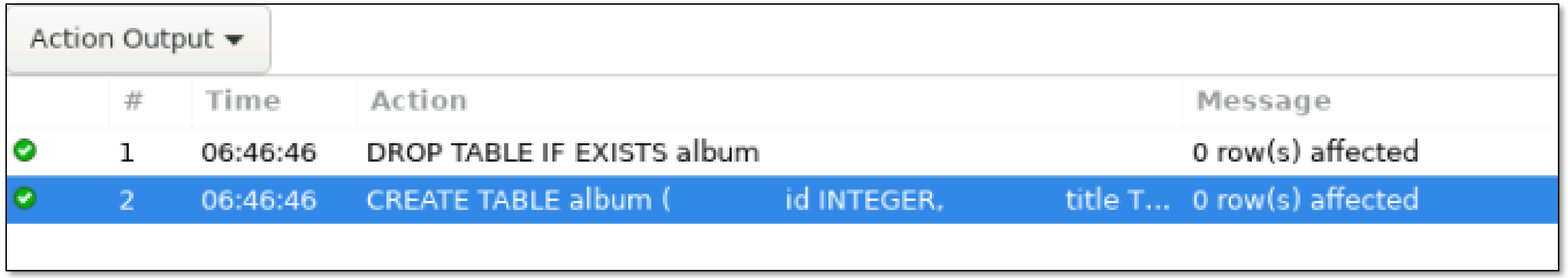
Step 01: Create a database named **track** and then make a table named **album** with the columns **id, title, artist, label,** and **release.** Here, **id** will be **'integer'** type and all other columns will be **'text'** type.

CREATE

```
DROP TABLE IF EXISTS album;
CREATE TABLE album (
id INTEGER,
title TEXT,
artist TEXT,
label TEXT,
released DATE
);
```

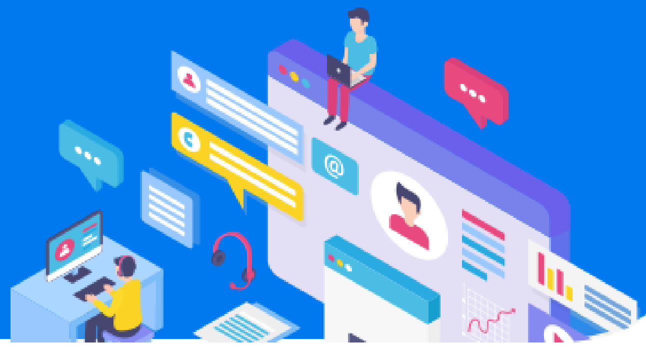
Assisted Practice: Functions One

Output:



	#	Time	Action	Message
✓	1	06:46:46	DROP TABLE IF EXISTS album	0 row(s) affected
✓	2	06:46:46	CREATE TABLE album (id INTEGER, title T...	0 row(s) affected

Assisted Practice: Functions One



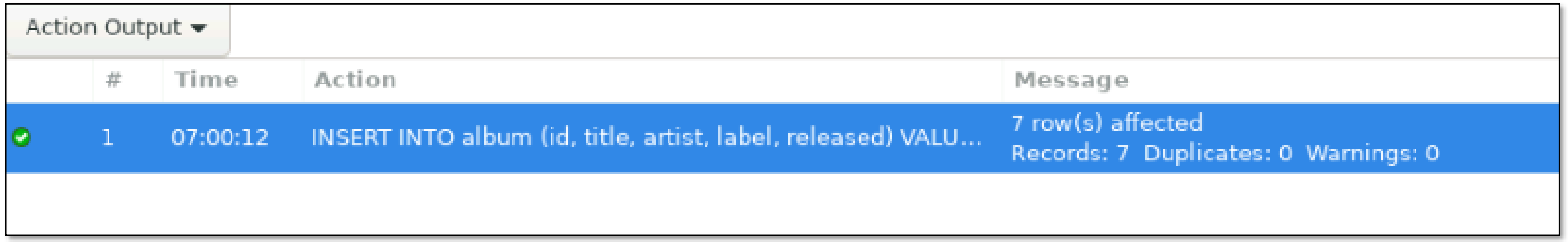
Step 02: Insert values in the **album** table

SQL Query

```
INSERT INTO album (id, title, artist, label, released) VALUES (1,'Two Men with the Blues','Willie Nelson
Marsalis','Blue Note','2008-07-08'),
(11,'Hendrix in the West','Jimi Hendrix','Polydor','2008-01-07'),
(12,'Rubber Soul','The Beatles','Columbia','2009-12-03'),
(13,'Birds of Fire','Mahavishnu Orchestra','Columbia','2010-03-03'),
(14,'Blue Train','John Coltrane','Blue Note','1957-09-15'),
(17,'Apostrophe','Frank Zappa','DiscReet','2011-04-07'),
(18,'Kind of Blue','Miles Davis','Columbia','2008-08-03');
```

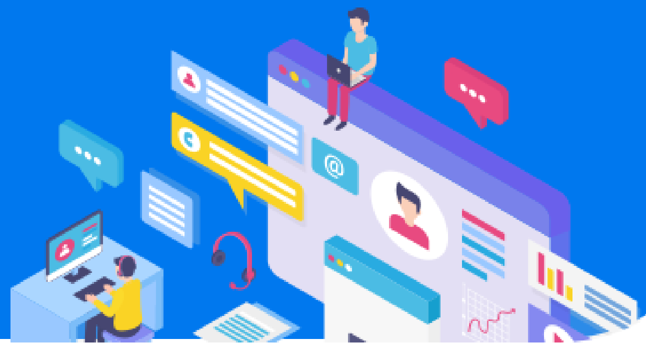
Assisted Practice: Functions One

Output:



	#	Time	Action	Message
✓	1	07:00:12	INSERT INTO album (id, title, artist, label, released) VALU...	7 row(s) affected Records: 7 Duplicates: 0 Warnings: 0

Assisted Practice: Functions One



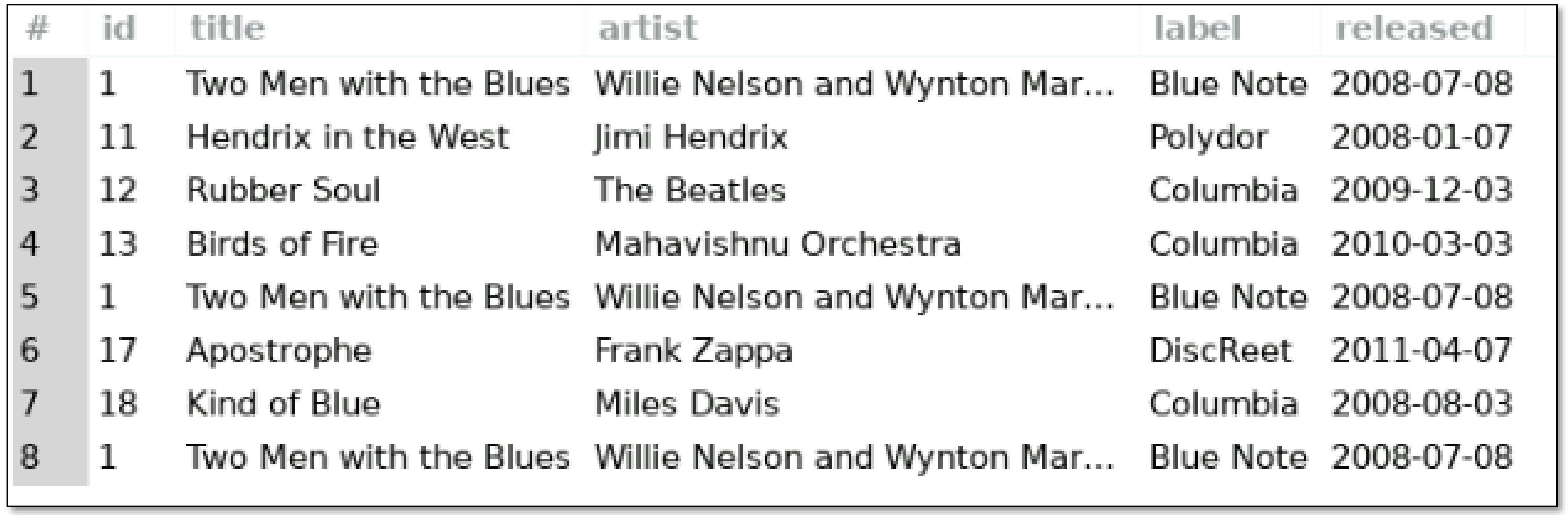
Step 03: Write a query to display the contents of the table

SQL Query

```
SELECT * from album;
```

Assisted Practice: Functions One

Output:



#	id	title	artist	label	released
1	1	Two Men with the Blues	Willie Nelson and Wynton Mar...	Blue Note	2008-07-08
2	11	Hendrix in the West	Jimi Hendrix	Polydor	2008-01-07
3	12	Rubber Soul	The Beatles	Columbia	2009-12-03
4	13	Birds of Fire	Mahavishnu Orchestra	Columbia	2010-03-03
5	1	Two Men with the Blues	Willie Nelson and Wynton Mar...	Blue Note	2008-07-08
6	17	Apostrophe	Frank Zappa	DiscReet	2011-04-07
7	18	Kind of Blue	Miles Davis	Columbia	2008-08-03
8	1	Two Men with the Blues	Willie Nelson and Wynton Mar...	Blue Note	2008-07-08

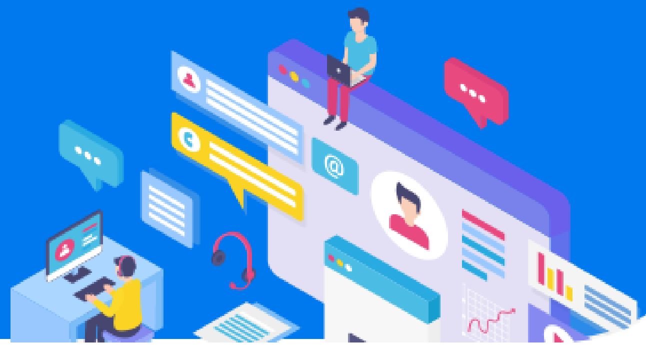
Assisted Practice: Functions One

Step 04: Write a query to find the number of unique albums released each year. Also, figure out which day number (i.e., from 1 to 31) has reported the most releases and for which category label.

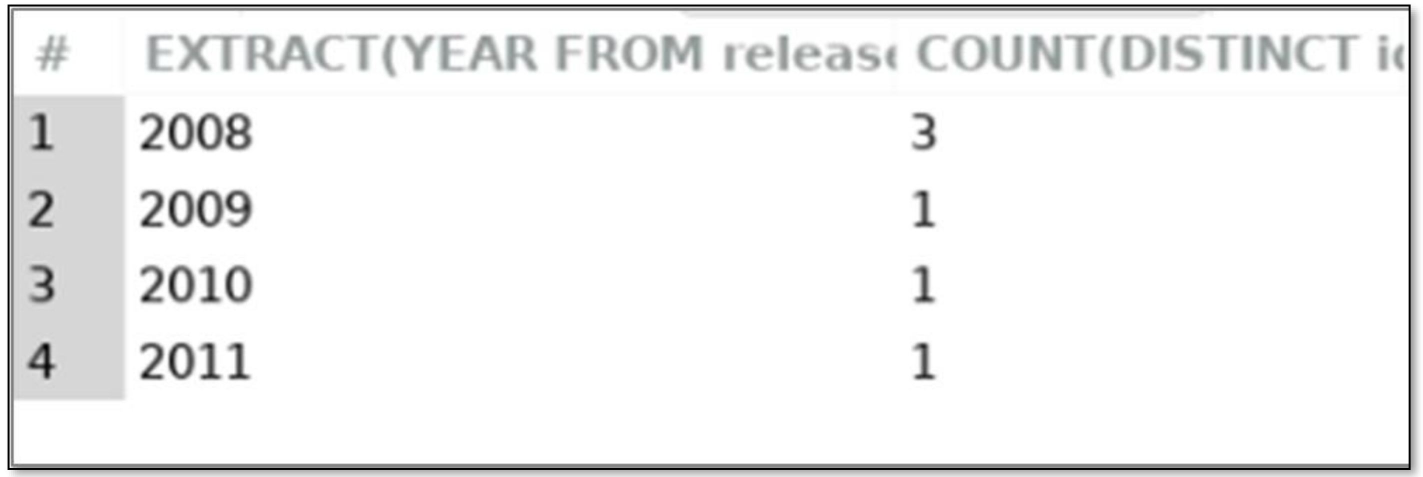
SQL Query

```
SELECT EXTRACT(YEAR FROM released), COUNT(DISTINCT id)
FROM album
GROUP BY EXTRACT(YEAR FROM released)
```

Assisted Practice: Functions One

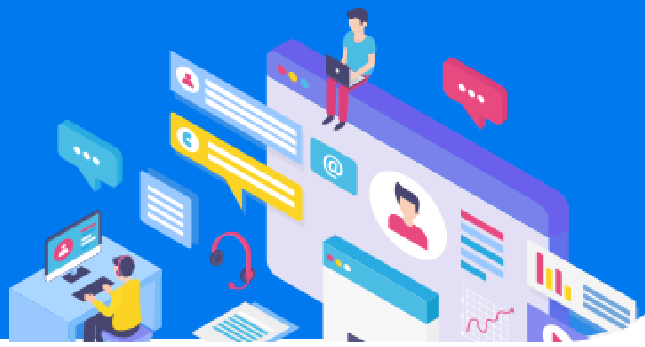


Output:



#	EXTRACT(YEAR FROM releas	COUNT(DISTINCT i
1	2008	3
2	2009	1
3	2010	1
4	2011	1

Assisted Practice: Functions One

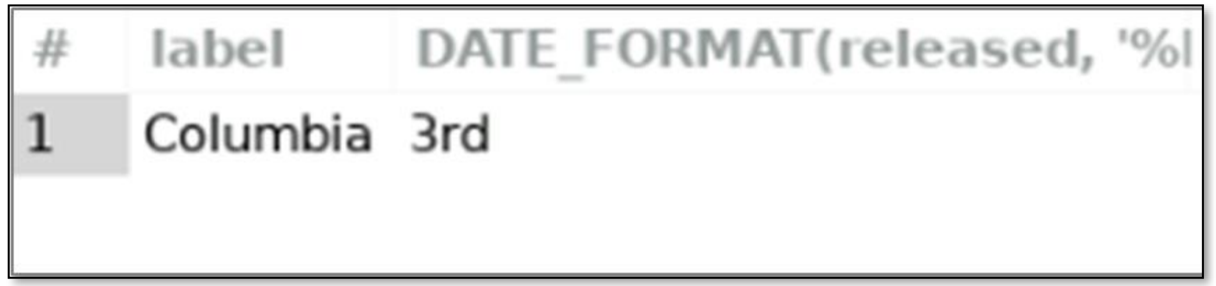


SQL Query

```
SELECT label, DATE_FORMAT(released, '%D')
FROM album
GROUP BY label, DATE_FORMAT(released, '%D')
ORDER BY COUNT(DISTINCT id) DESC
LIMIT 1 ;
```

Assisted Practice: Functions One

Output:



#	label	DATE_FORMAT(released, '%l
1	Columbia	3rd

Handling Duplicate Records

Handling Duplicate Records

The duplicate records can be handled in two ways:

- Using DISTINCT and COUNT keywords to fetch the number of unique records.
- Using COUNT and GROUP BY keywords to eliminate the duplicate records.

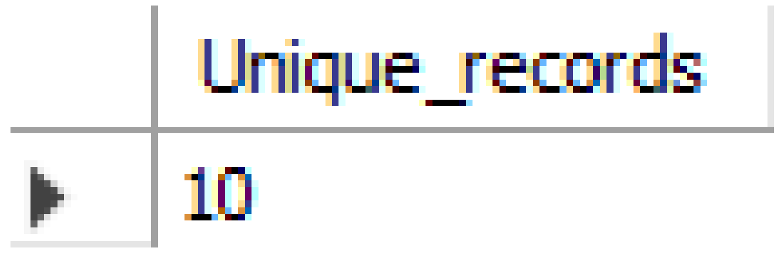
Handling Duplicate Records

Using DISTINCT and COUNT keywords to fetch the number of unique records.

Example

```
SELECT COUNT(DISTINCT(category))
AS Unique_records FROM product;
```

Output



	Unique_records
▶	10

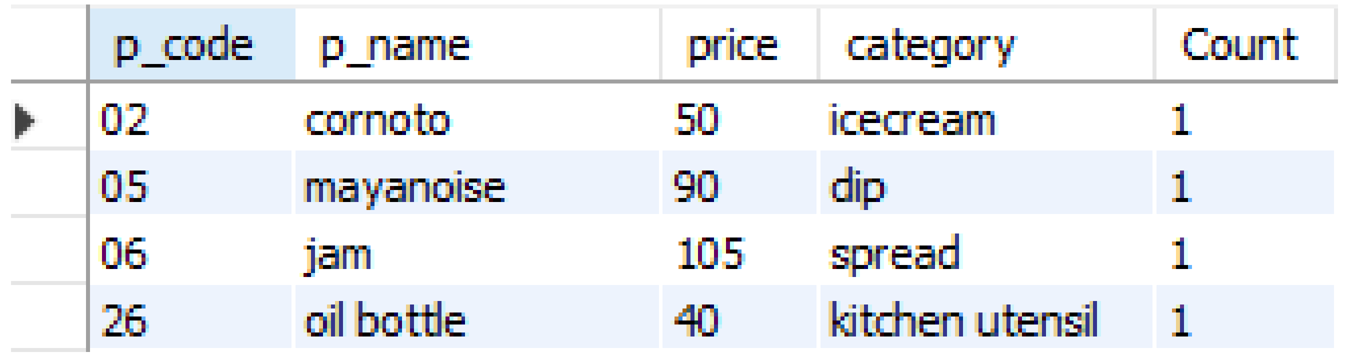
Handling Duplicate Records

Using COUNT and GROUP BY keywords to eliminate the duplicate records.

Example

```
SELECT p_code, p_name, price, category,
    COUNT(*) AS Count
FROM
    product
GROUP BY
    category
HAVING
    COUNT(*) = 1;
```

Output



p_code	p_name	price	category	Count
02	cornoto	50	icecream	1
05	mayanoise	90	dip	1
06	jam	105	spread	1
26	oil bottle	40	kitchen utensil	1

Problem Statement

Problem Scenario: You are working in a superstore as a junior database administrator. Your manager informed you that the table of your superstore has duplicate customer IDs due to multiple orders from the same customer.

Objective: You are required to filter all the duplicate values and display the list of unique customers.

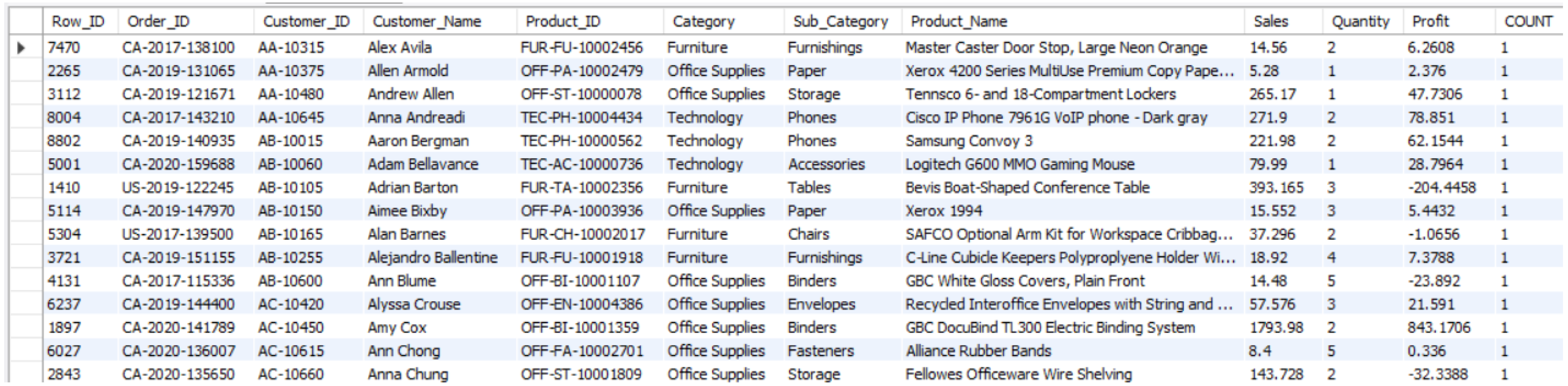
Solution

Query

```
SELECT Customer_ID , COUNT(DISTINCT Customer_ID) as Count
FROM example.superstore
GROUP BY Customer_ID;
```

Output

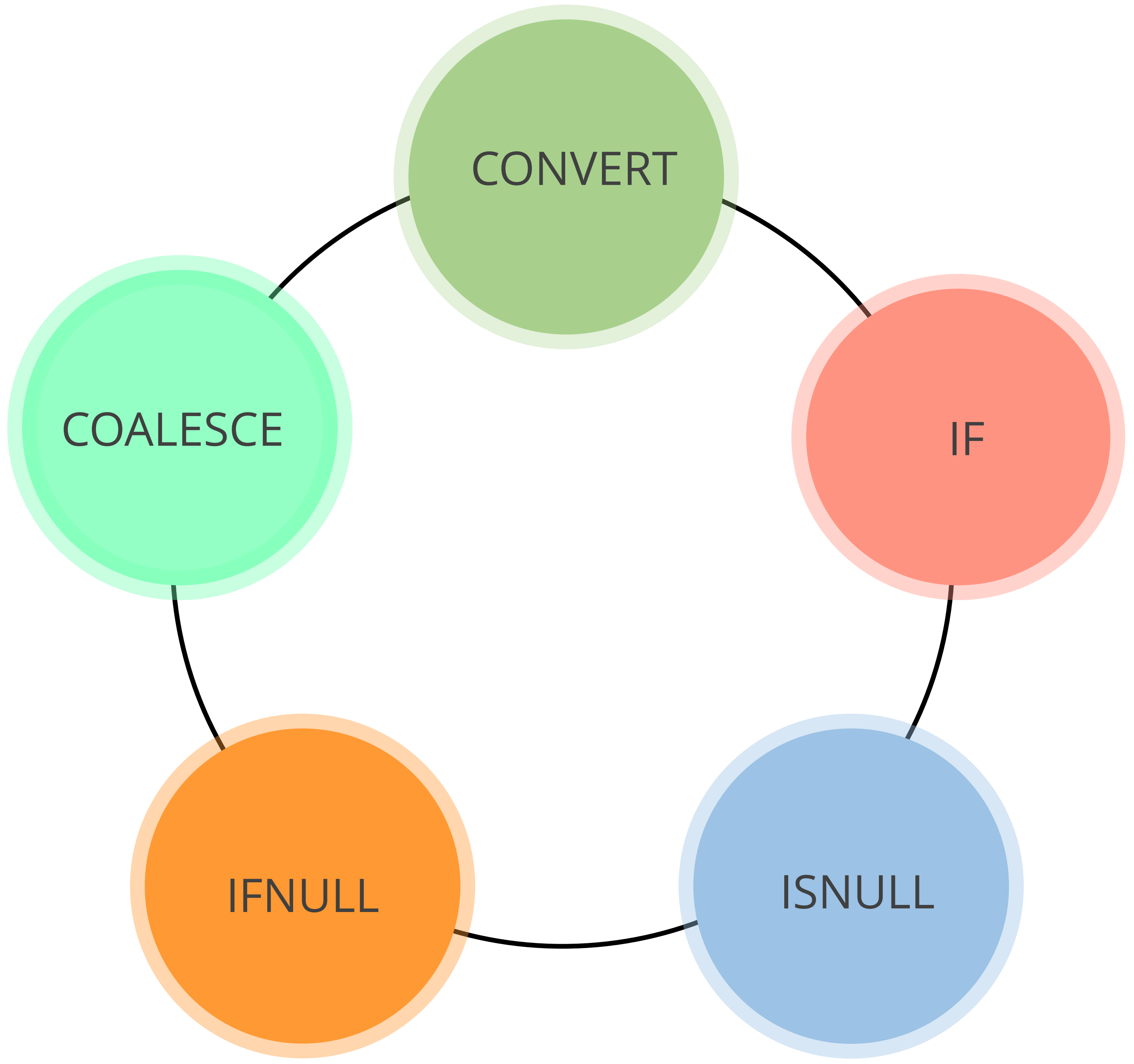
After executing the query, we get the list of unique customers.



Row_ID	Order_ID	Customer_ID	Customer_Name	Product_ID	Category	Sub_Category	Product_Name	Sales	Quantity	Profit	COUNT
7470	CA-2017-138100	AA-10315	Alex Avila	FUR-FU-10002456	Furniture	Furnishings	Master Caster Door Stop, Large Neon Orange	14.56	2	6.2608	1
2265	CA-2019-131065	AA-10375	Allen Armold	OFF-PA-10002479	Office Supplies	Paper	Xerox 4200 Series MultiUse Premium Copy Pape...	5.28	1	2.376	1
3112	CA-2019-121671	AA-10480	Andrew Allen	OFF-ST-10000078	Office Supplies	Storage	Tennsco 6- and 18-Compartment Lockers	265.17	1	47.7306	1
8004	CA-2017-143210	AA-10645	Anna Andreadi	TEC-PH-10004434	Technology	Phones	Cisco IP Phone 7961G VoIP phone - Dark gray	271.9	2	78.851	1
8802	CA-2019-140935	AB-10015	Aaron Bergman	TEC-PH-10000562	Technology	Phones	Samsung Convoy 3	221.98	2	62.1544	1
5001	CA-2020-159688	AB-10060	Adam Bellavance	TEC-AC-10000736	Technology	Accessories	Logitech G600 MMO Gaming Mouse	79.99	1	28.7964	1
1410	US-2019-122245	AB-10105	Adrian Barton	FUR-TA-10002356	Furniture	Tables	Bevis Boat-Shaped Conference Table	393.165	3	-204.4458	1
5114	CA-2019-147970	AB-10150	Aimee Bixby	OFF-PA-10003936	Office Supplies	Paper	Xerox 1994	15.552	3	5.4432	1
5304	US-2017-139500	AB-10165	Alan Barnes	FUR-CH-10002017	Furniture	Chairs	SAFCO Optional Arm Kit for Workspace Cribbag...	37.296	2	-1.0656	1
3721	CA-2019-151155	AB-10255	Alejandro Ballentine	FUR-FU-10001918	Furniture	Furnishings	C-Line Cubicle Keepers Polyproplyene Holder Wi...	18.92	4	7.3788	1
4131	CA-2017-115336	AB-10600	Ann Blume	OFF-BI-10001107	Office Supplies	Binders	GBC White Gloss Covers, Plain Front	14.48	5	-23.892	1
6237	CA-2019-144400	AC-10420	Alyssa Crouse	OFF-EN-10004386	Office Supplies	Envelopes	Recycled Interoffice Envelopes with String and ...	57.576	3	21.591	1
1897	CA-2020-141789	AC-10450	Amy Cox	OFF-BI-10001359	Office Supplies	Binders	GBC DocuBind TL300 Electric Binding System	1793.98	2	843.1706	1
6027	CA-2020-136007	AC-10615	Ann Chong	OFF-FA-10002701	Office Supplies	Fasteners	Alliance Rubber Bands	8.4	5	0.336	1
2843	CA-2020-135650	AC-10660	Anna Chung	OFF-ST-10001809	Office Supplies	Storage	Fellowes Officeware Wire Shelving	143.728	2	-32.3388	1

Miscellaneous Functions

Miscellaneous Functions and Its Types



Convert Function

Definition

Convert function converts a value into a specified data type.

Syntax

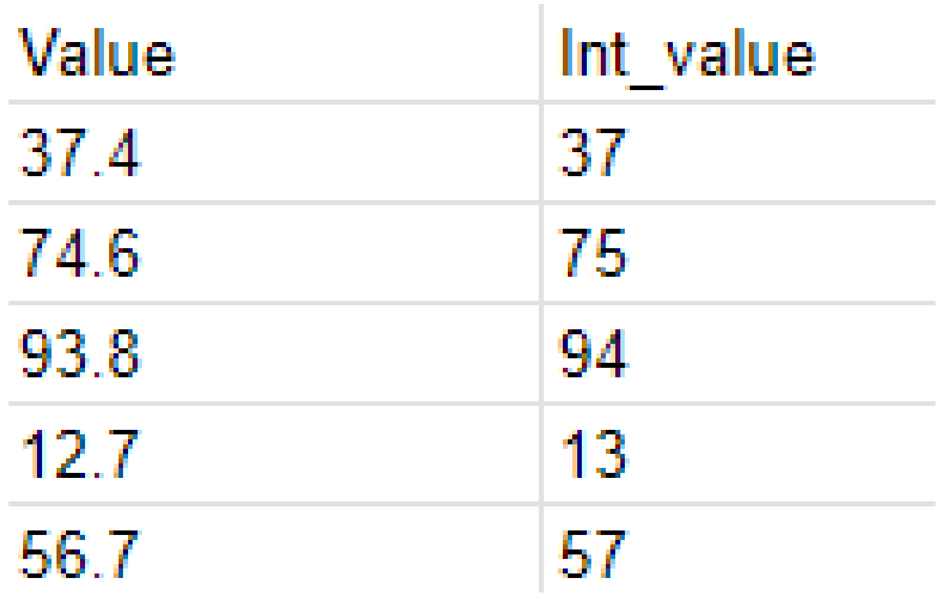
```
select CONVERT(value,datatype);
```

Convert Example

Example

```
SELECT CONVERT(Value,int)  AS
Int_value;
```

Output



Value	Int_value
37.4	37
74.6	75
93.8	94
12.7	13
56.7	57

IF Function

Definition

IF function returns value1 if the expression is TRUE, or value2 if the expression is FALSE.

Syntax

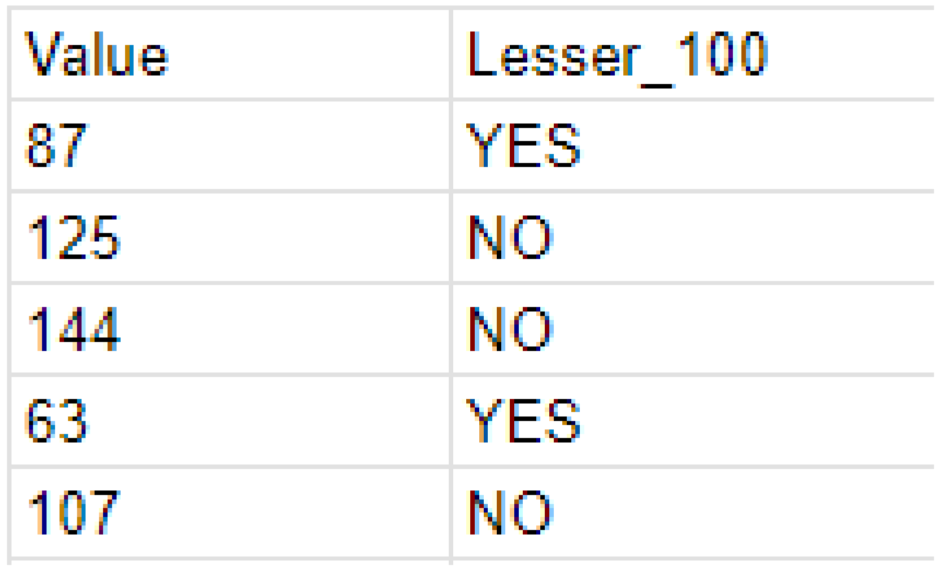
```
select  IF(expression,VALUE1,VALUE2);
```

IF Example

Example

```
SELECT IF(Value<100,'YES','NO’) AS
Lesser_100;
```

Output



Value	Lesser_100
87	YES
125	NO
144	NO
63	YES
107	NO

ISNULL Function

Definition

ISNULL function returns 1 if the expression is NULL or else 0 if the expression is NOT NULL.

Syntax

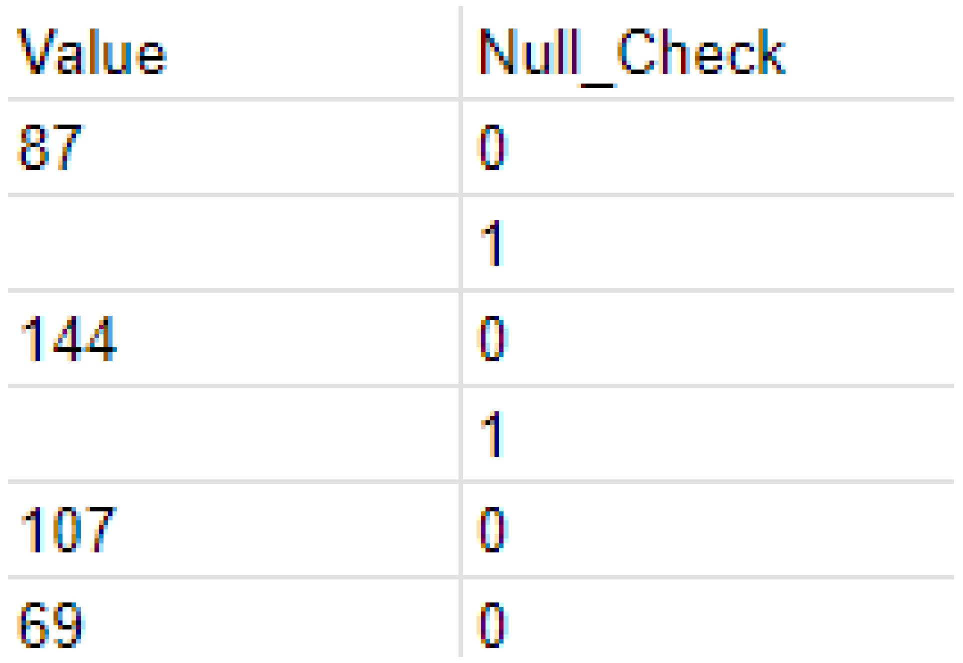
```
select  ISNULL(expression)
```

ISNULL Example

Example

```
SELECT ISNULL(Value) AS Null_Check;
```

Output



Value	Null_Check
87	0
	1
144	0
	1
107	0
69	0

IFNULL Function

Definition

- IFNULL function takes two expression.
- It returns the first expression if the first expression is NOT NULL otherwise returns the second expression.

Syntax

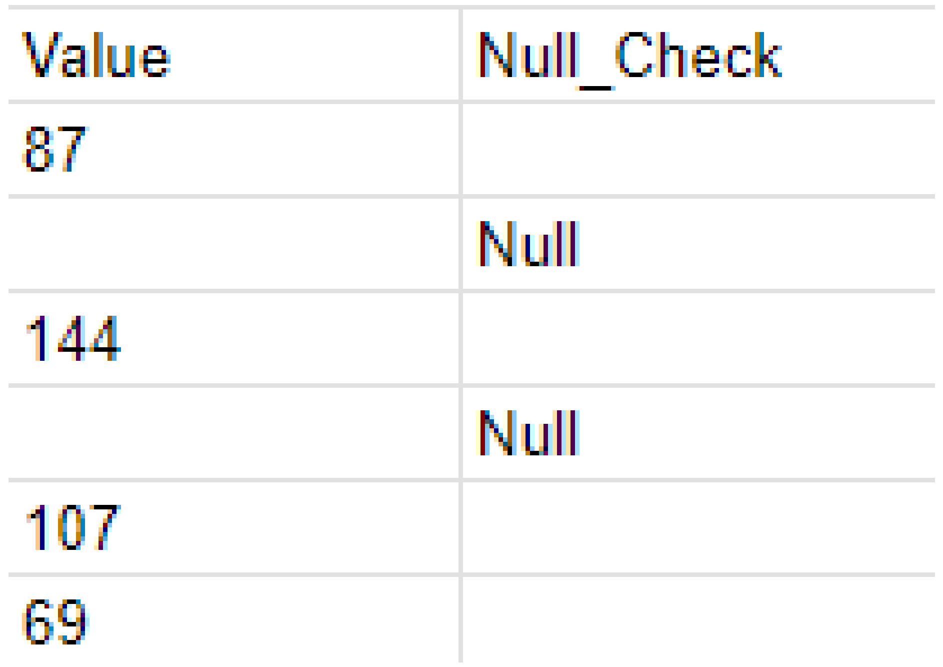
```
select  IFNULL(expression1,expression2)
```

IFNULL Example

Example

```
SELECT IFNULL(Value,’Null’) AS
Null_Check
```

Output



Value	Null_Check
87	
	Null
144	
	Null
107	
69	

Coalesce Function

Definition

Coalesce function returns the first non-null value from a list of expressions.

Syntax

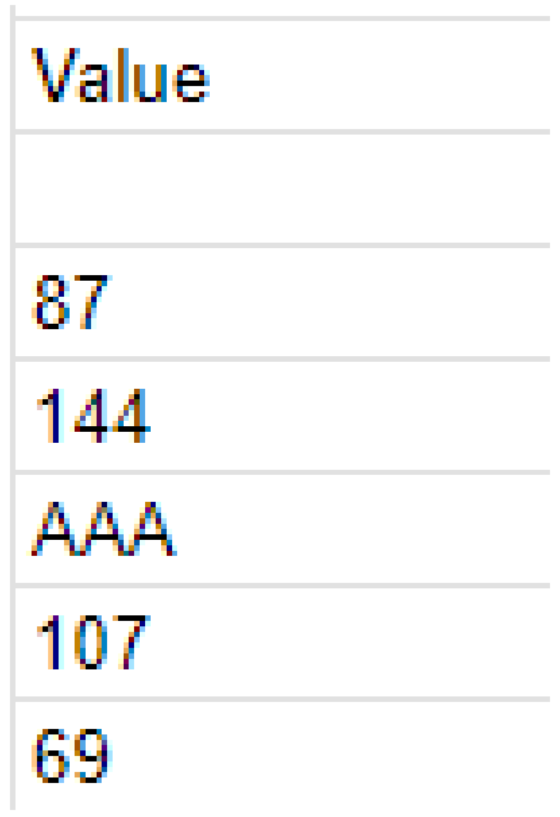
```
select  COALESCE(expression1,expression2,…..)
```

Coalesce Example

Example

```
SELECT COALESCE(Value);
```

Output



Value
87
144
AAA
107
69

87

Problem Statement

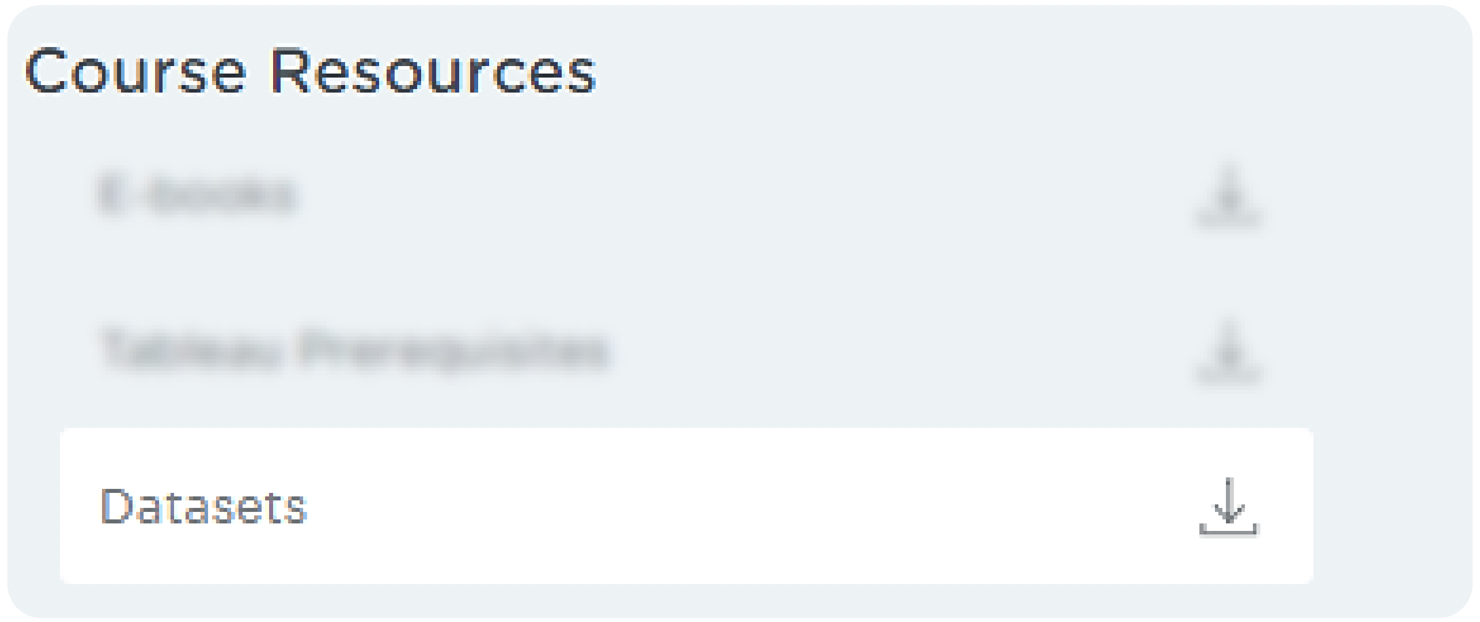
Problem Scenario: You are working in a superstore as a junior database administrator. Your manager has asked you to cross-check the database for any NULL value.

Objective: You are required to check for NULL value in the database and display the output message as **problem in the record** if any NULL value is found in the table.

Problem Statement

Steps to be performed:

1. Download the **return_products** table from course resources and import it in MySQL workbench.



Solution

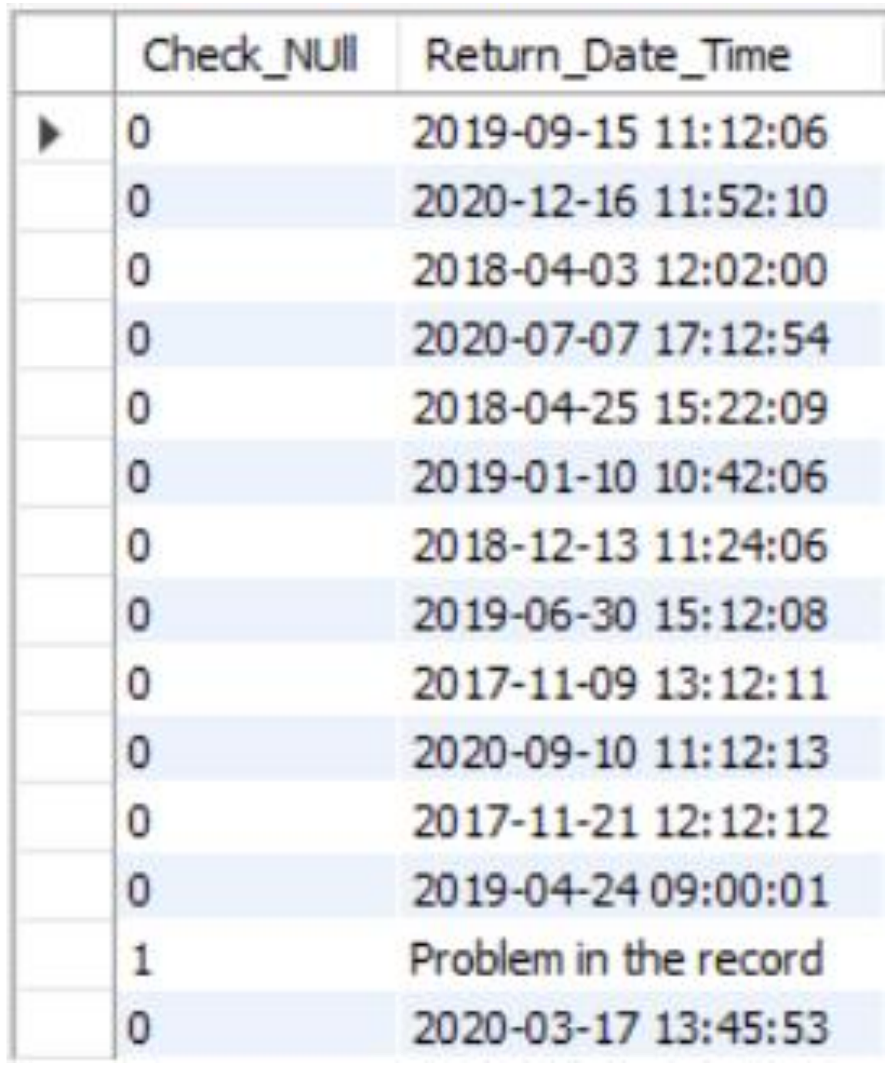
Query

```
SELECT ISNULL(Return_Date_Time) as Check_NULL, IFNULL(Return_Date_Time,'Problem in the record')
as Return_Date_Time

FROM example.return_products;
```

Output

After executing the query, a message is displayed in the table when it encounters a NULL value.



Check_NUll	Return_Date_Time
0	2019-09-15 11:12:06
0	2020-12-16 11:52:10
0	2018-04-03 12:02:00
0	2020-07-07 17:12:54
0	2018-04-25 15:22:09
0	2019-01-10 10:42:06
0	2018-12-13 11:24:06
0	2019-06-30 15:12:08
0	2017-11-09 13:12:11
0	2020-09-10 11:12:13
0	2017-11-21 12:12:12
0	2019-04-24 09:00:01
1	Problem in the record
0	2020-03-17 13:45:53

Problem Statement

Problem Scenario: You are working in a superstore as a junior database administrator. Your manager has asked you to check the profit or loss in the profit column and convert the datatype of the quantity column to decimal.

Objective: You are required to check for profit in the profit column and convert the datatype of the quantity column to decimal.

Solution

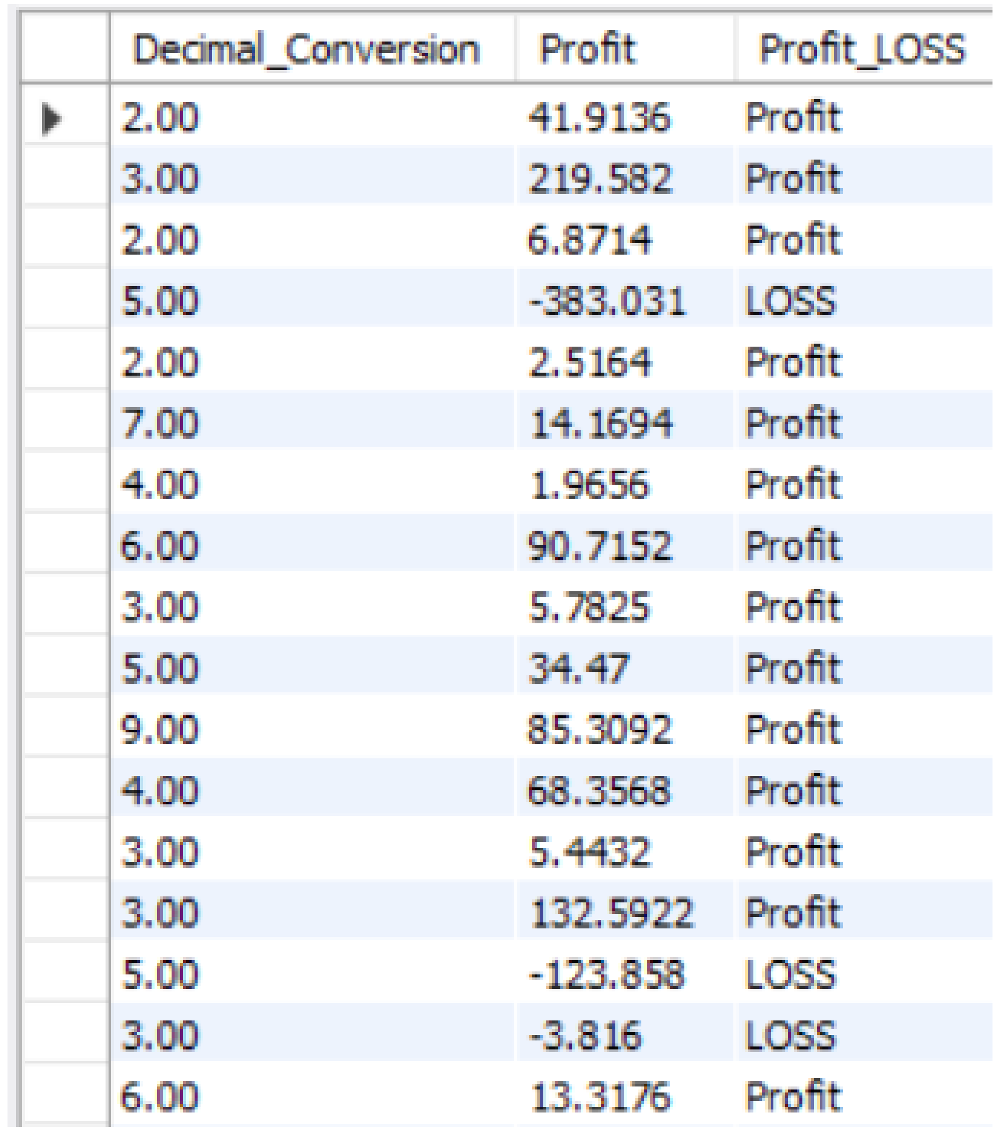
Query

```
SELECT Convert(Quantity, Decimal(10,2)) as Decimal_Conversion, Profit,
IF((ABS(Profit))!=profit, 'LOSS', 'Profit') as Profit_LOSS

FROM example.superstore;
```

Output

After executing the query, we can check the profit or loss.



Decimal_Conversion	Profit	Profit_LOSS
2.00	41.9136	Profit
3.00	219.582	Profit
2.00	6.8714	Profit
5.00	-383.031	LOSS
2.00	2.5164	Profit
7.00	14.1694	Profit
4.00	1.9656	Profit
6.00	90.7152	Profit
3.00	5.7825	Profit
5.00	34.47	Profit
9.00	85.3092	Profit
4.00	68.3568	Profit
3.00	5.4432	Profit
3.00	132.5922	Profit
5.00	-123.858	LOSS
3.00	-3.816	LOSS
6.00	13.3176	Profit

Problem Statement

Problem Scenario You are working in a superstore as a junior database administrator. Your manager has asked you to check for NULL values in the table **return_products**.

Objective: You are required to check for NULL values in the table and display **NULL value** as a message if any **NULL value** exists in the table.

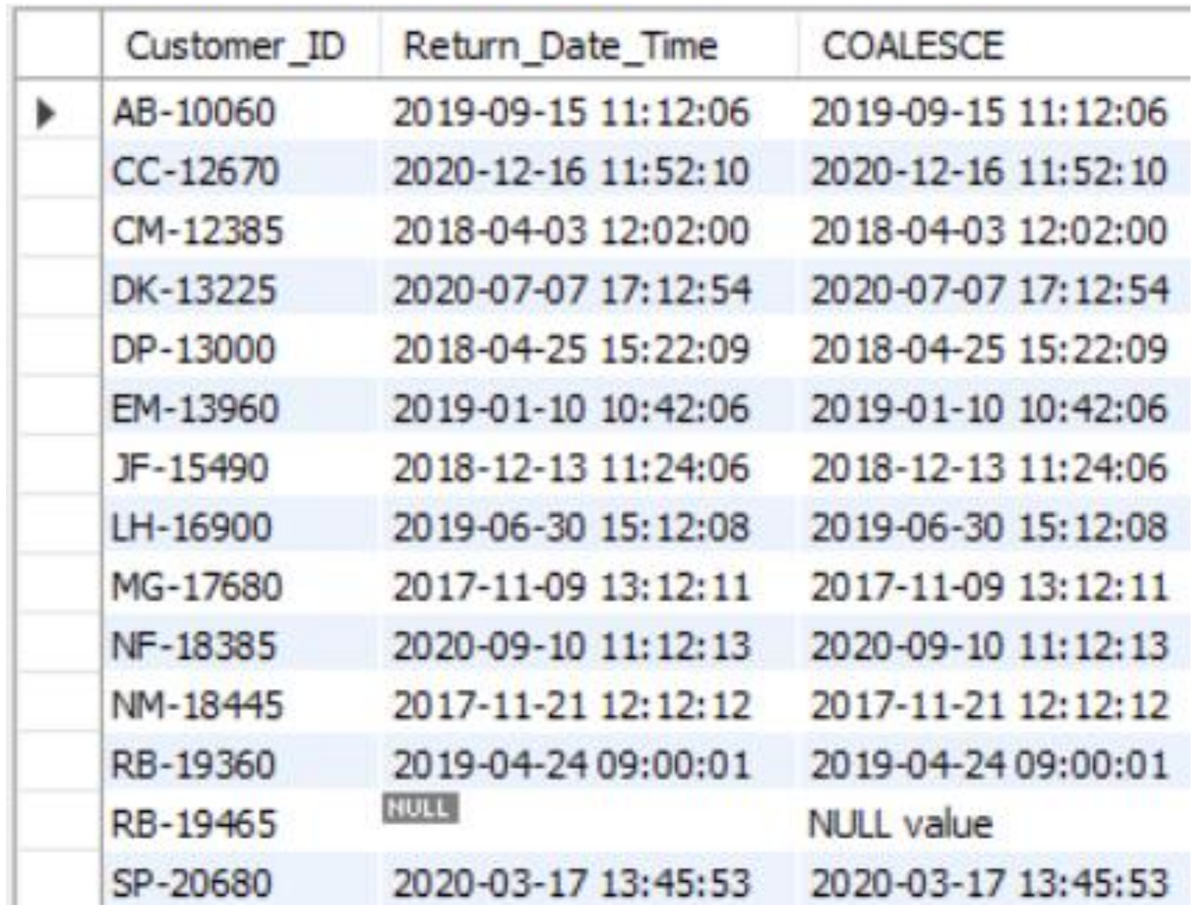
Solution

Query

```
SELECT *, COALESCE(Return_Date_Time,NULL,'NULL value',NULL,NULL,5) as COALESCE
FROM example.return_products;
```

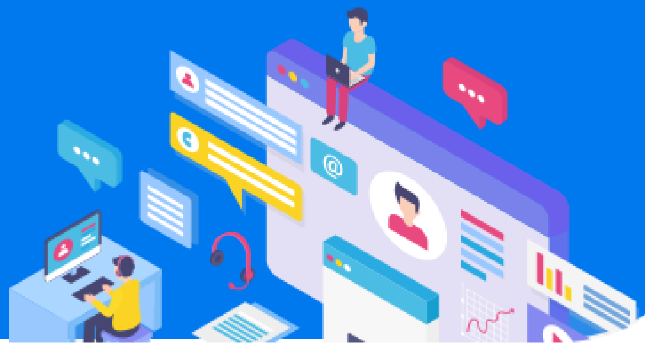
Output

After executing the query, the message is displayed as NULL value when we encounter the first NON-NULL value in the table.



Customer_ID	Return_Date_Time	COALESCE
AB-10060	2019-09-15 11:12:06	2019-09-15 11:12:06
CC-12670	2020-12-16 11:52:10	2020-12-16 11:52:10
CM-12385	2018-04-03 12:02:00	2018-04-03 12:02:00
DK-13225	2020-07-07 17:12:54	2020-07-07 17:12:54
DP-13000	2018-04-25 15:22:09	2018-04-25 15:22:09
EM-13960	2019-01-10 10:42:06	2019-01-10 10:42:06
JF-15490	2018-12-13 11:24:06	2018-12-13 11:24:06
LH-16900	2019-06-30 15:12:08	2019-06-30 15:12:08
MG-17680	2017-11-09 13:12:11	2017-11-09 13:12:11
NF-18385	2020-09-10 11:12:13	2020-09-10 11:12:13
NM-18445	2017-11-21 12:12:12	2017-11-21 12:12:12
RB-19360	2019-04-24 09:00:01	2019-04-24 09:00:01
RB-19465	NULL	NULL value
SP-20680	2020-03-17 13:45:53	2020-03-17 13:45:53

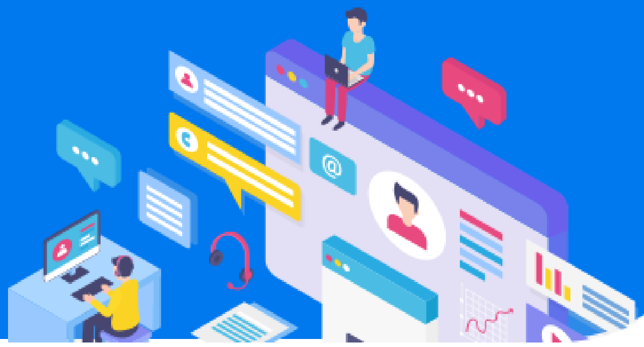
Assisted Practice: Functions Two



Duration: 20 mins

Problem statement: As a data analyst, you have been asked to clean up the **product_sales** data. You will need to perform missing value treatment by implementing proper business logic.

Assisted Practice: Functions Two



Steps to be performed:

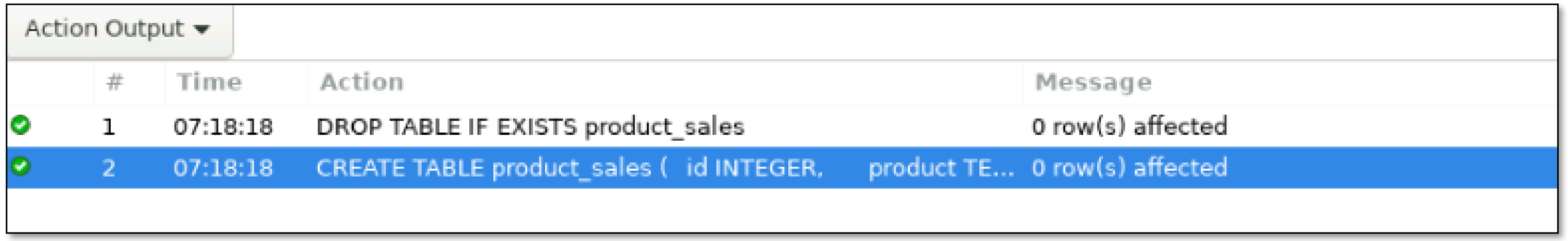
Step 01: Create a database named **product** and then make a table named **product_sales** with the columns **id (int), product (text), order_date (date),** and **amount (int)**

CREATE

```
DROP TABLE IF EXISTS sales;
CREATE TABLE product_sales (
id INTEGER,
product TEXT,
order_date DATE,
amount INT
);
```

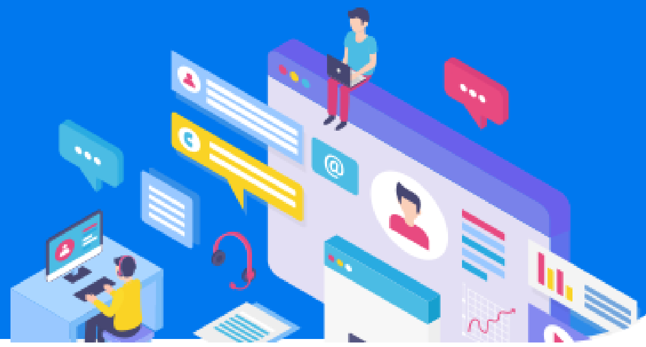
Assisted Practice: Functions Two

Output:



```
    #  Time      Action                                                    Message
✓   1  07:18:18  DROP TABLE IF EXISTS product_sales                        0 row(s) affected
✓   2  07:18:18  CREATE TABLE product_sales (   id INTEGER,   product TE... 0 row(s) affected
```

Assisted Practice: Functions Two

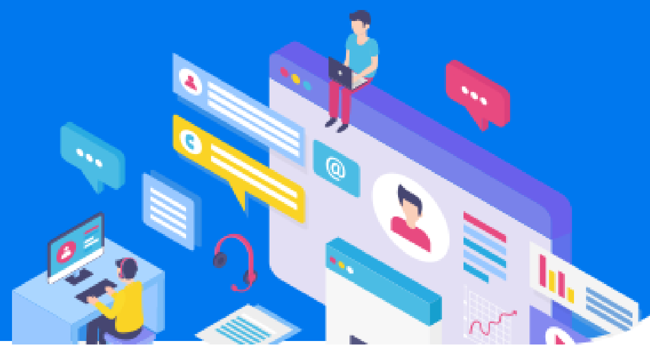


Step 02: Insert values in the **product_sales** table

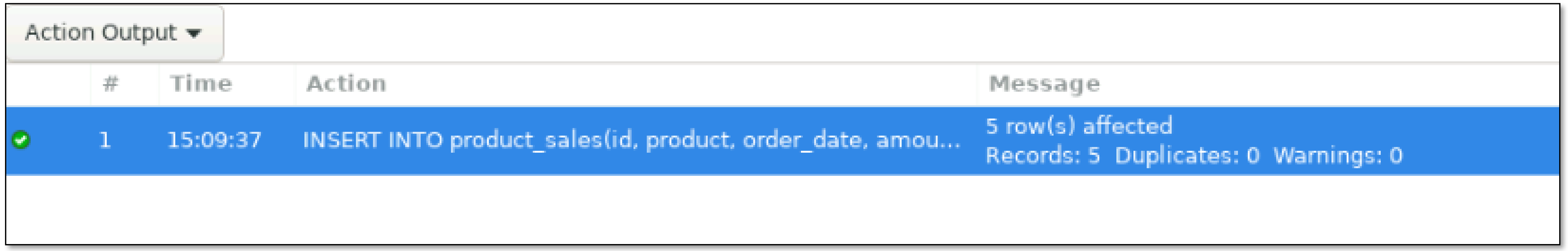
Query

```
INSERT INTO product_sales(id, product, order_date, amount)
VALUES(1, 'YogaMat','2020-01-01',150),
(2, 'Rod','2020-01-01',50),
(3, 'Dumbell',null,100),
(4, 'YogaMat','2020-01-01',null),
(5, 'Bench','2020-01-01',null);
```

Assisted Practice: Functions Two

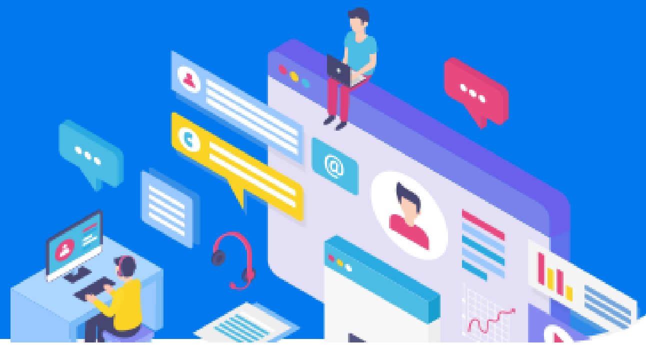


Output:



```
#   Time      Action                                                      Message
1   15:09:37  INSERT INTO product_sales(id, product, order_date, amou...  5 row(s) affected
                                                                          Records: 5  Duplicates: 0  Warnings: 0
```

Assisted Practice: Functions Two

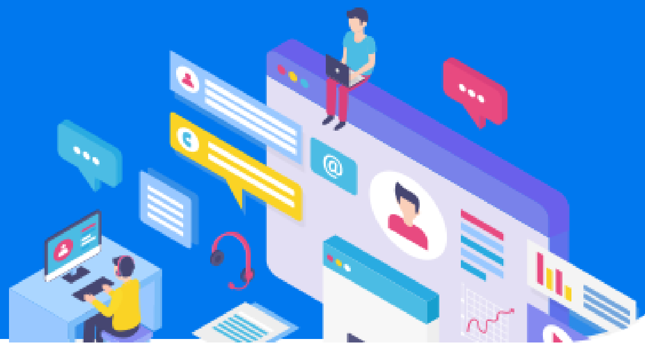


Step 03: Write a query to display the contents of the table

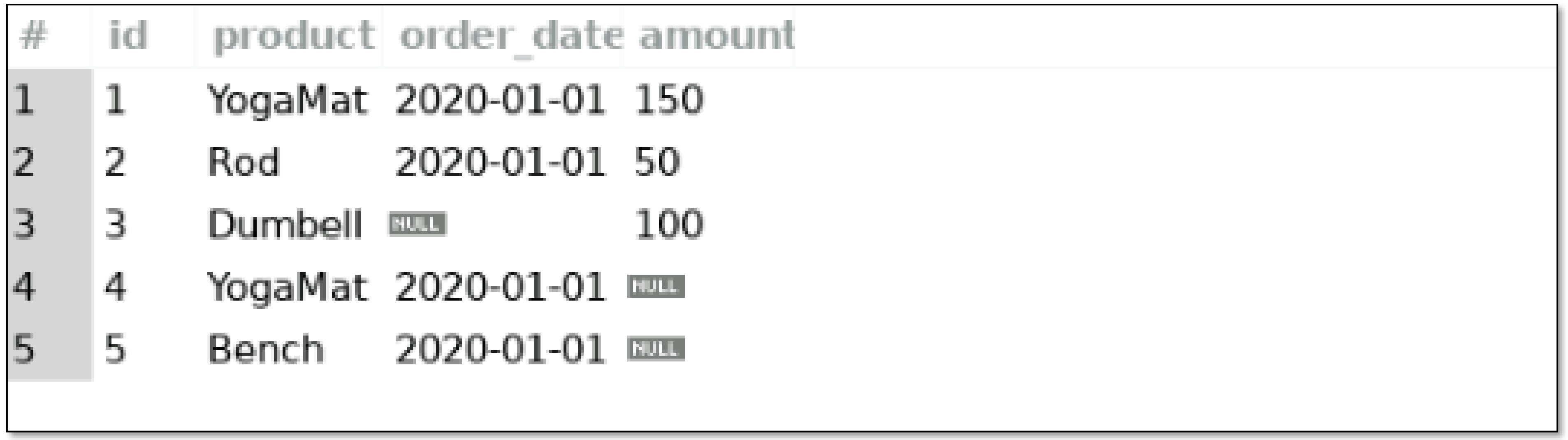
Query

```
SELECT * from product_sales;
```

Assisted Practice: Functions Two

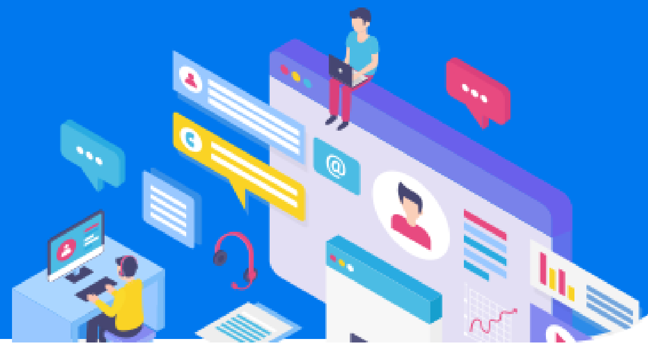


Output:



#	id	product	order_date	amount
1	1	YogaMat	2020-01-01	150
2	2	Rod	2020-01-01	50
3	3	Dumbell	NULL	100
4	4	YogaMat	2020-01-01	NULL
5	5	Bench	2020-01-01	NULL

Assisted Practice: Functions Two



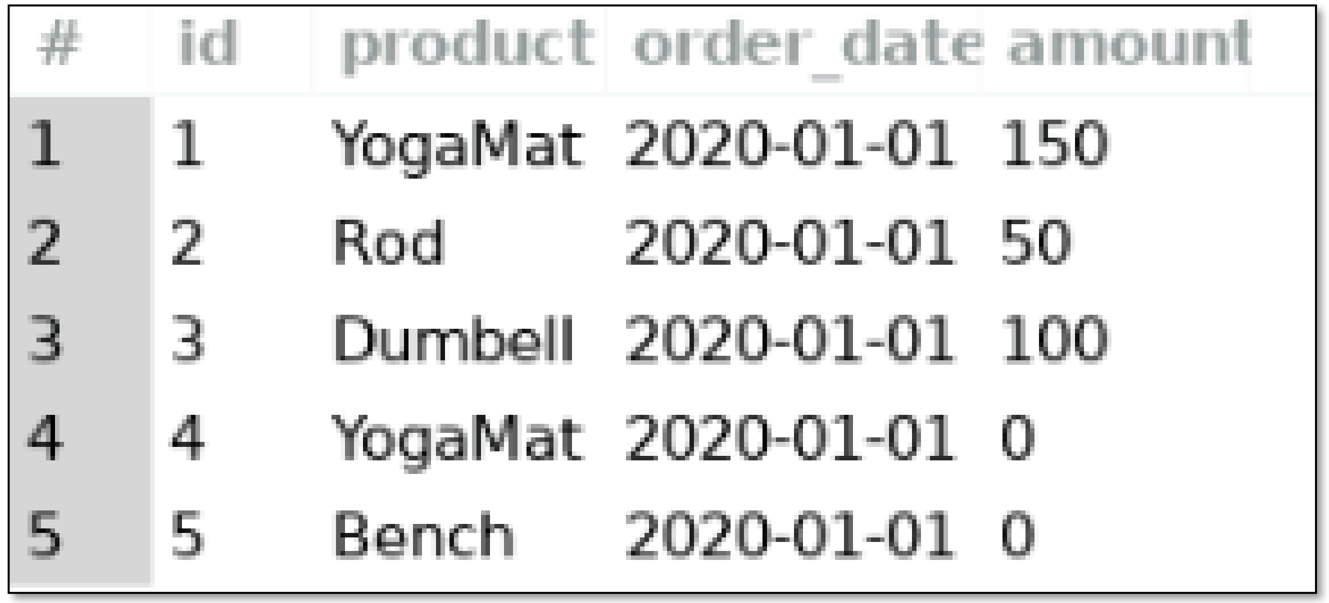
Step 04: Write a query to display the entire data. Replace ***null*** in the **amount** column with ***0*** and ***null*** in **order_date** column with ***2020-01-01***.

Query

```
SELECT id, product, COALESCE(order_date,'2020-01-01') order_date,
COALESCE(amount,0) amount
FROM product_sales
```

Assisted Practice: Functions Two

Output:



#	id	product	order_date	amount
1	1	YogaMat	2020-01-01	150
2	2	Rod	2020-01-01	50
3	3	Dumbell	2020-01-01	100
4	4	YogaMat	2020-01-01	0
5	5	Bench	2020-01-01	0

Knowledge Check

Knowledge Check

1

Which one of the following is an aggregate function?

A. Sum ( )

B. Date ( )

C. Concat ( )

D. Trim ( )

Knowledge Check

1

Which one of the following is an aggregate function?

A. Sum ( )

B. Date ( )

C. Concat ( )

D. Trim ( )

The correct answer is **A**

Sum function is an aggregate function.

Knowledge Check

2

Which of the following works on each record independently?

A. Aggregate function

B. Scalar function

C. Date and time function

D. Numeric function

Knowledge Check

2

Which of the following works on each record independently?

A. Aggregate function

B. Scalar function

C. Date and time function

D. Numeric function

The correct answer is **B, C, and D.**

Scalar, date and time, and numeric functions work in each record independently.

Knowledge Check 3

Which of the following function returns largest integer value which is less than or equal to the given number ?

A. Ceil ( )

B. Floor ( )

C. Round ( )

D. MOD ( )

Knowledge Check

3

Which of the following function returns largest integer value which is less than or equal to the given number ?

A. Ceil ( )

B. Floor ( )

C. Round ( )

D. MOD ( )

The correct answer is **B**

Floor function returns largest integer value which is less than or equal to the given number.

Knowledge Check

4

Which of the following function helps to change a value into specific data type?

A. Convert ( )

B. IFNULL ( )

C. Coalesce ( )

D. ISNULL ( )

Knowledge Check

4

Which of the following function helps to change a value into specific data type?

A. Convert ( )

B. IFNULL ( )

C. Coalesce ( )

D. ISNULL ( )

The correct answer is **A**

Convert function helps to convert a value into specific data type.

Lesson-End Project: Patient Diagnosis Report

Problem statement:

You are a data analyst working in a hospital and you have been asked to store the patients' diagnosis reports as a best practice.

Objective:

The objective is to design a database to retrieve, update, and modify the patients' details to keep track of the patients' health.

Note: Download the **patients_datasets.csv** file from **Course Resources** to perform the required tasks

Lesson-End Project: Patient Diagnosis Report

Tasks to be performed:

1. Write a query to create a **patients** table with the date, patient ID, patient name, age, weight, gender, location, phone number, disease, doctor name, and doctor ID fields
2. Write a query to insert values into the **patients** table
3. Write a query to display the total number of patients in the table
4. Write a query to display the patient ID, patient name, gender, and disease of the oldest (age) patient

Lesson-End Project: Patient Diagnosis Report

Tasks to be performed:

5. Write a query to display the patient ID and patient name of all entries with the current date
6. Write a query to display the old patient name and new patient name in uppercase
7. Write a query to display the patients' names along with the total number of characters in their name
8. Write a query to display the gender of the patient as M or F along with the patient's name

Lesson-End Project: Patient Diagnosis Report

Tasks to be performed:

9. Write a query to combine the patient's name and doctor's name in a new column
10. Write a query to display the patients’ age along with the logarithmic value (base 10) of their age
11. Write a query to extract the year for a given date and place it in a separate column
12. Write a query to check the patient’s name and doctor’s name are similar and display **NULL**, else return the patient’s name

Lesson-End Project: Patient Diagnosis Report

Tasks to be performed:

13. Write a query to check if a patient's age is greater than 40 and display **Yes** if it is and **No** if it isn't
14. Write a query to display duplicate entries in the doctor name column

Note: Download the solution document from the **Course Resources** section and follow the steps given in the document

Key Takeaways

- SQL functions are basic subprograms used extensively to handle or manipulate data.
- Aggregate functions allow performing the calculation on a set of values to return a single scalar value.
- Scalar functions return a single value from an input value. It works on each record independently.
- String functions are used for string manipulation.
- Duplicate records can be handled by using the keywords- DISTINCT, COUNT, and GROUP BY.