Retrieving Data Using the SQL `SELECT` Statement

Lesson Agenda

- Sorting rows using the `ORDER BY` clause
- Substitution variables
- Single-row SQL functions
- Character functions
- Number functions
- Working with dates
- Date functions

Using the ORDER BY Clause

- Sort retrieved rows with the ORDER BY clause:
  - ASC: Ascending order, default
  - DESC: Descending order
- The ORDER BY clause comes last in the SELECT statement:

```
SELECT   last_name, job_id, department_id, hire_date
FROM     employees
ORDER BY hire_date ;
```

	LAST_NAME	JOB_ID	DEPARTMENT_ID	HIRE_DATE
1	King	AD_PRES	90	17-JUN-87
2	Whalen	AD_ASST	10	17-SEP-87
3	Kochhar	AD_VP	90	21-SEP-89
4	Hunold	IT_PROG	60	03-JAN-90
5	Ernst	IT_PROG	60	21-MAY-91
6	De Haan	AD_VP	90	13-JAN-93

...

Sorting

- Sorting in descending order:

```
SELECT   last_name, job_id, department_id, hire_date
FROM     employees
ORDER BY hire_date DESC ;
```

1

- Sorting by column alias:

```
SELECT employee_id, last_name, salary*12 annsal
FROM   employees
ORDER BY annsal ;
```

2

Sorting

- Sorting by using the column's numeric position:

```
SELECT   last_name, job_id, department_id, hire_date
FROM     employees
ORDER BY 3;
```

3

- Sorting by multiple columns:

```
SELECT last_name, department_id, salary
FROM   employees
ORDER BY department_id, salary DESC;
```

4

Lesson Agenda

- Sorting rows using the ORDER BY clause
- Single-row SQL functions
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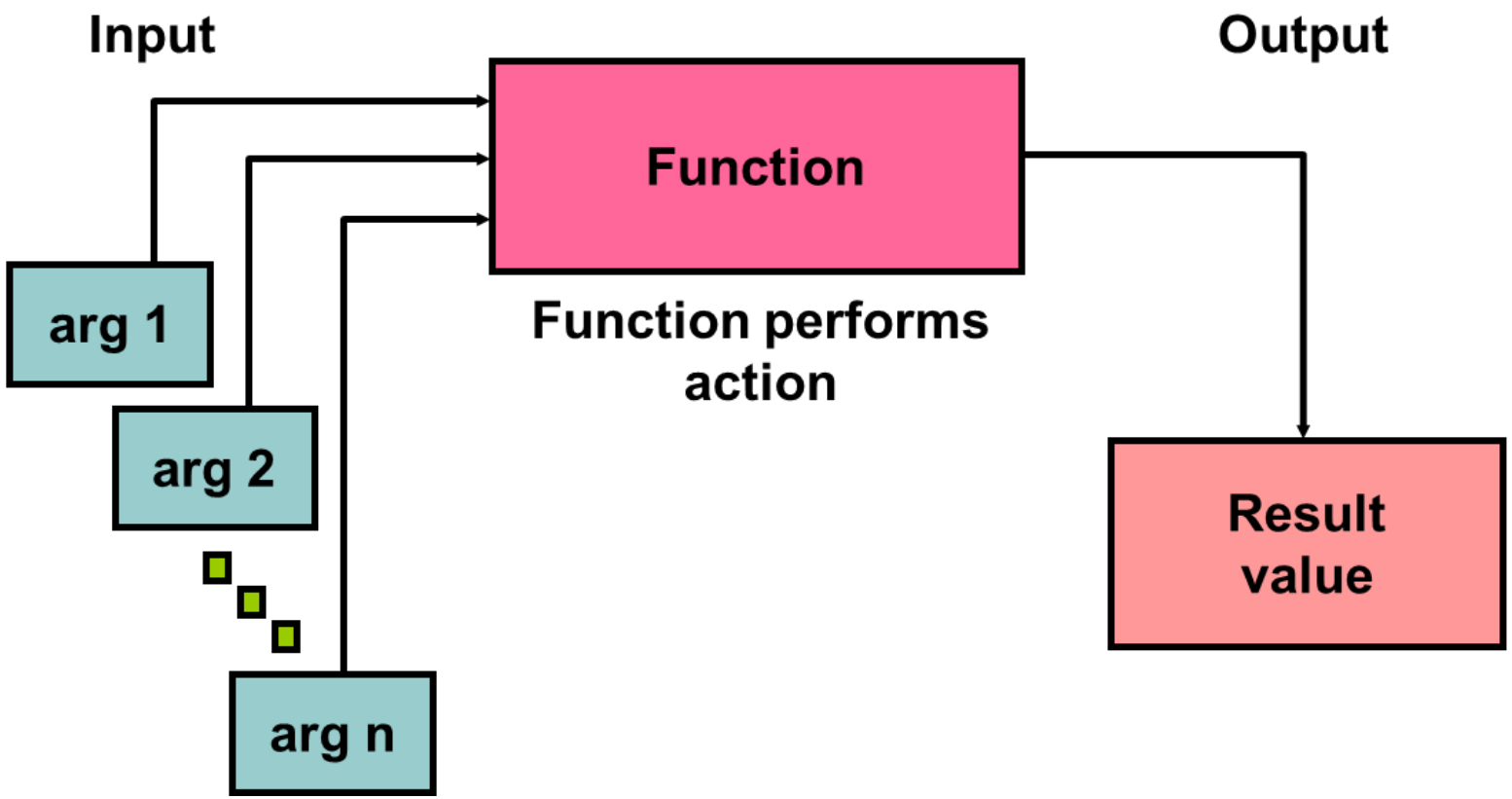
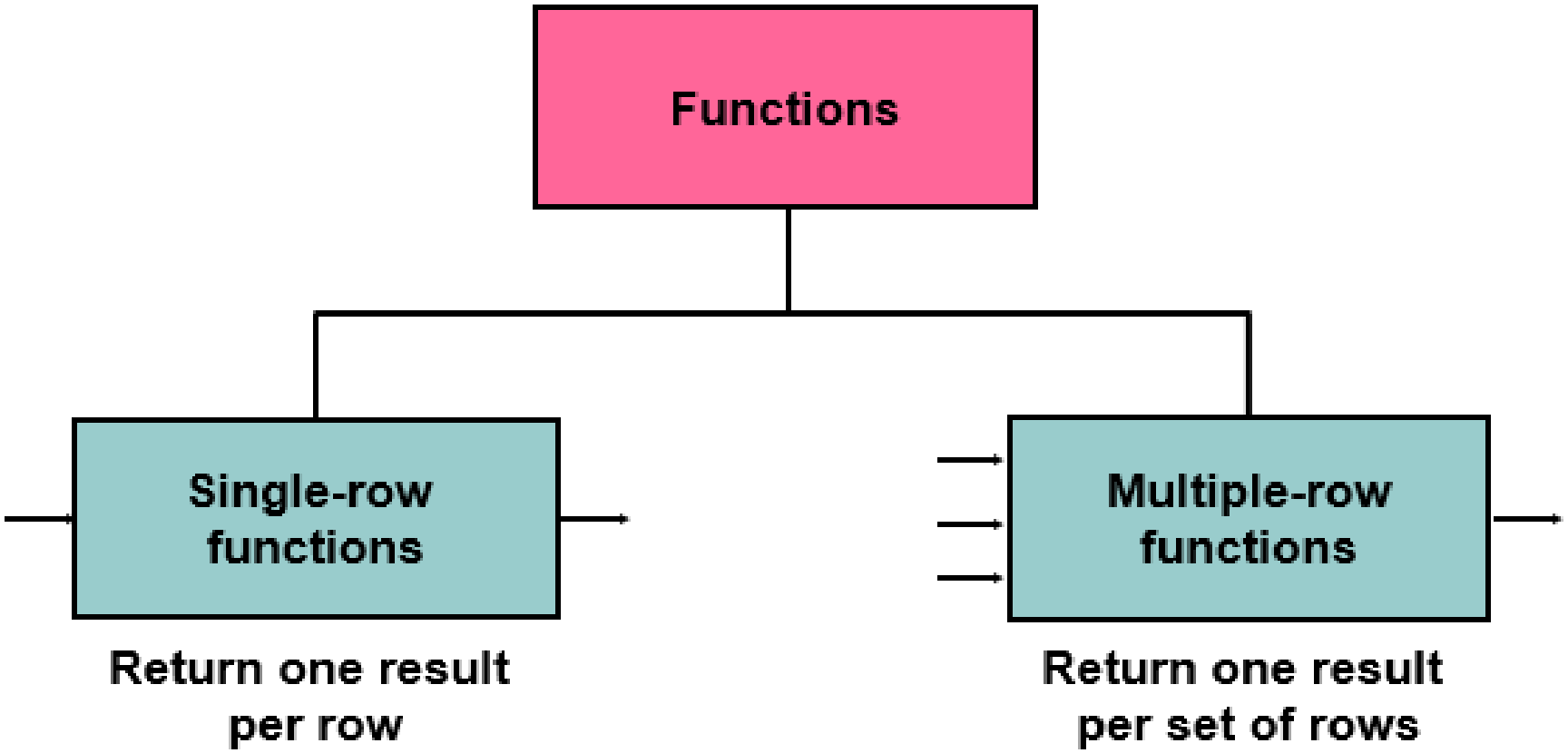
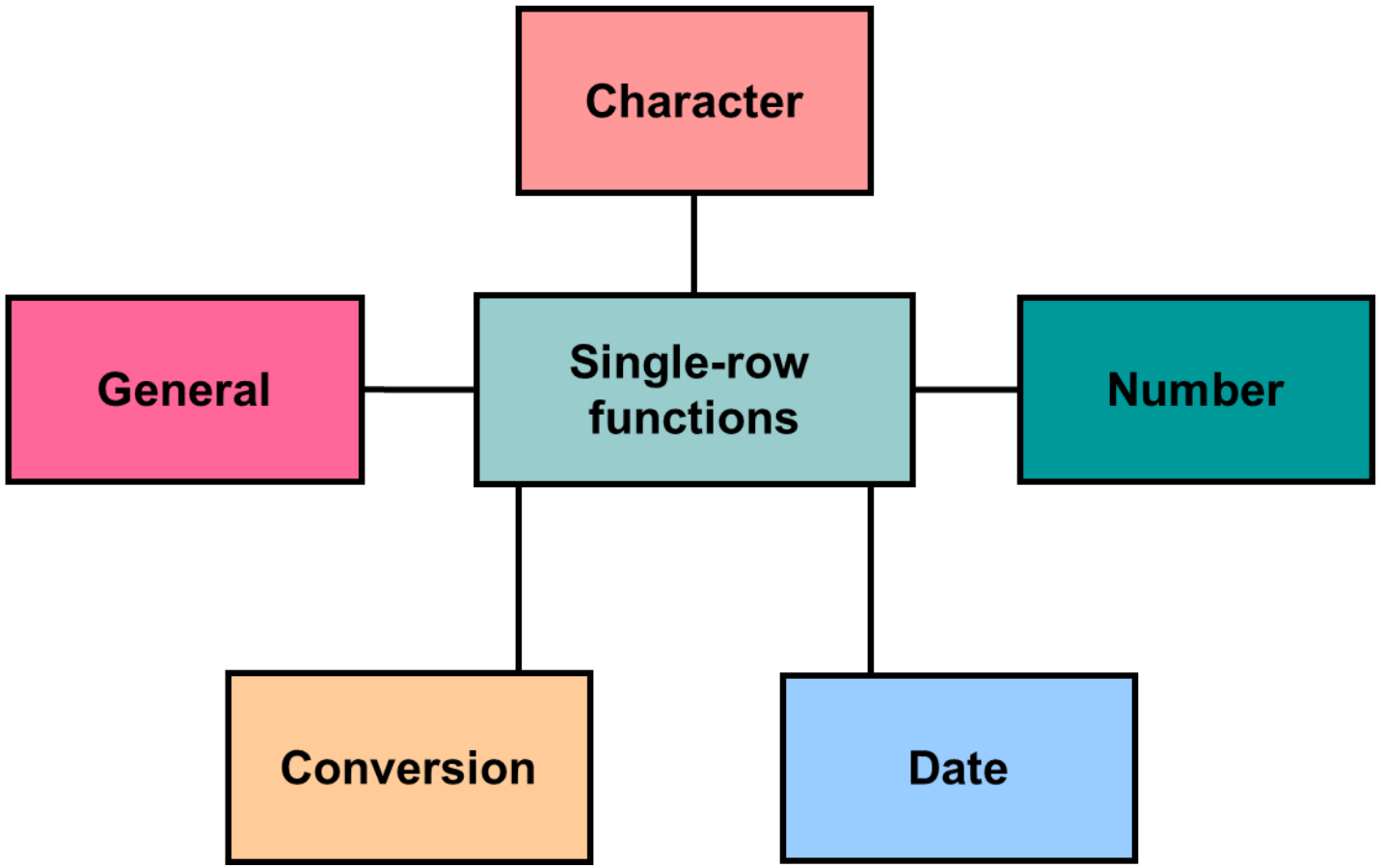
SQL Functions



Two Types of SQL Functions



Single-Row Functions



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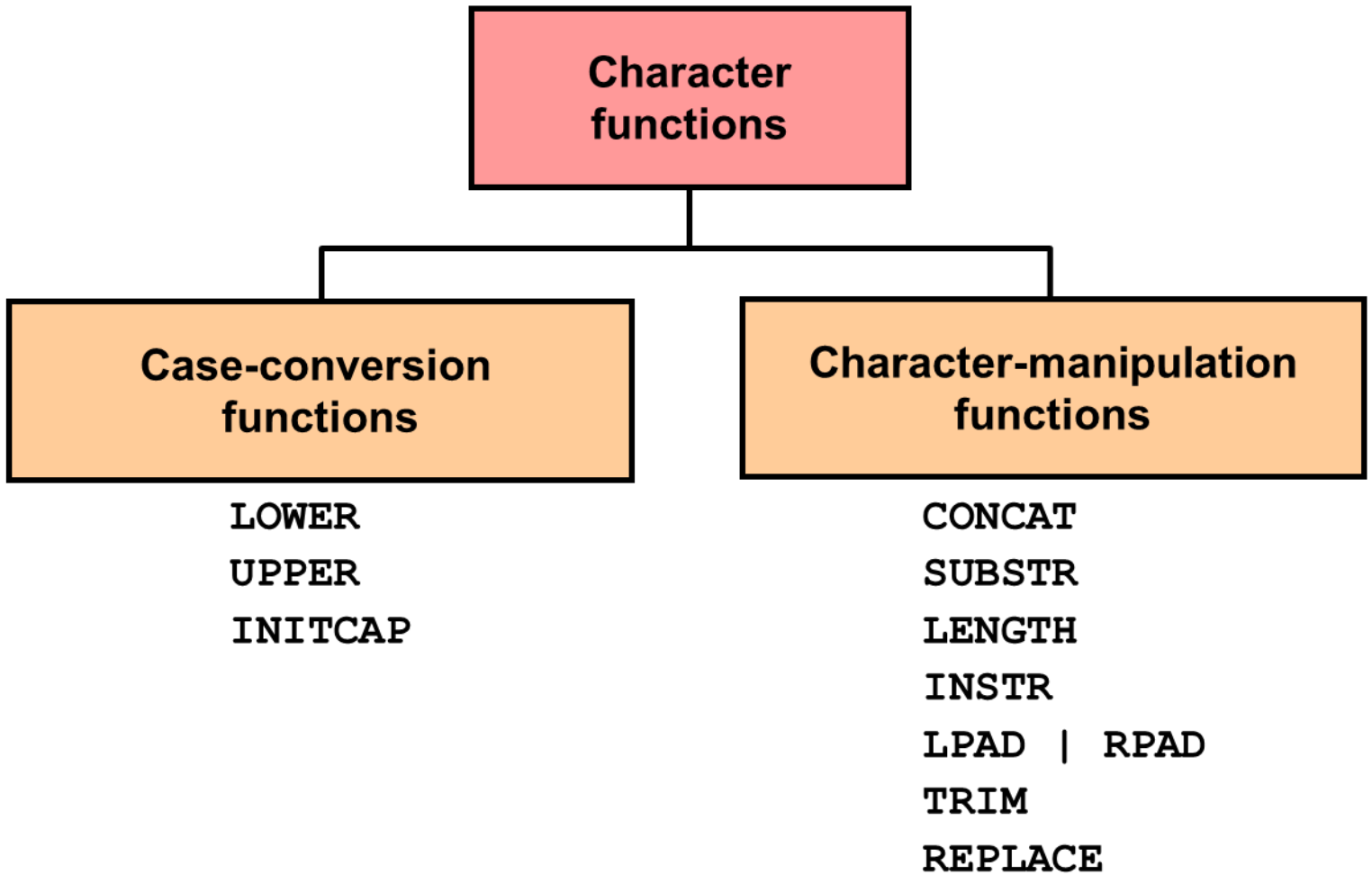
Character Functions



Case-Conversion Functions

These functions convert the case for character strings:

Function	Result
`LOWER('SQL Course')`	`sql course`
`UPPER('SQL Course')`	`SQL COURSE`
`INITCAP('SQL Course')`	`Sql Course`

Using Case-Conversion Functions

Display the employee number, name, and department number for employee Higgins:

```
SELECT employee_id, last_name, department_id
FROM   employees
WHERE  last_name = 'higgins';
```

```
0 rows selected
```

```
SELECT employee_id, last_name, department_id
FROM   employees
WHERE  LOWER(last_name) = 'higgins';
```

	EMPLOYEE_ID	LAST_NAME	DEPARTMENT_ID
1	205	Higgins	110

Character-Manipulation Functions

These functions manipulate character strings:

Function	Result
`CONCAT('Hello', 'World')`	`HelloWorld`
`SUBSTR('HelloWorld',1,5)`	`Hello`
`LENGTH('HelloWorld')`	`10`
`INSTR('HelloWorld', 'W')`	`6`
`LPAD(salary,10,'*')`	`*****24000`
`RPAD(salary, 10, '*')`	`24000*****`
`REPLACE ('JACK and JUE','J','BL')`	`BLACK and BLUE`
`TRIM('H' FROM 'HelloWorld')`	`elloWorld`

Using the Character-Manipulation Functions

```
SELECT employee_id, CONCAT(first_name, last_name) NAME,
       job_id, LENGTH (last_name),
       INSTR(last_name, 'a') "Contains 'a'?"
FROM   employees
WHERE  SUBSTR(job_id, 4) = 'REP';
```

1 2 3

	EMPLOYEE_ID	NAME	JOB_ID	LENGTH(LAST_NAME)	Contains 'a'?
1	174	EllenAbel	SA_REP	4	0
2	176	JonathonTaylor	SA_REP	6	2
3	178	KimberelyGrant	SA_REP	5	3
4	202	PatFay	MK_REP	3	2

1 2 3

Using the Character-Manipulation Functions

```
SELECT LPAD(last_name, 15, "ABC");
FROM   employees
```

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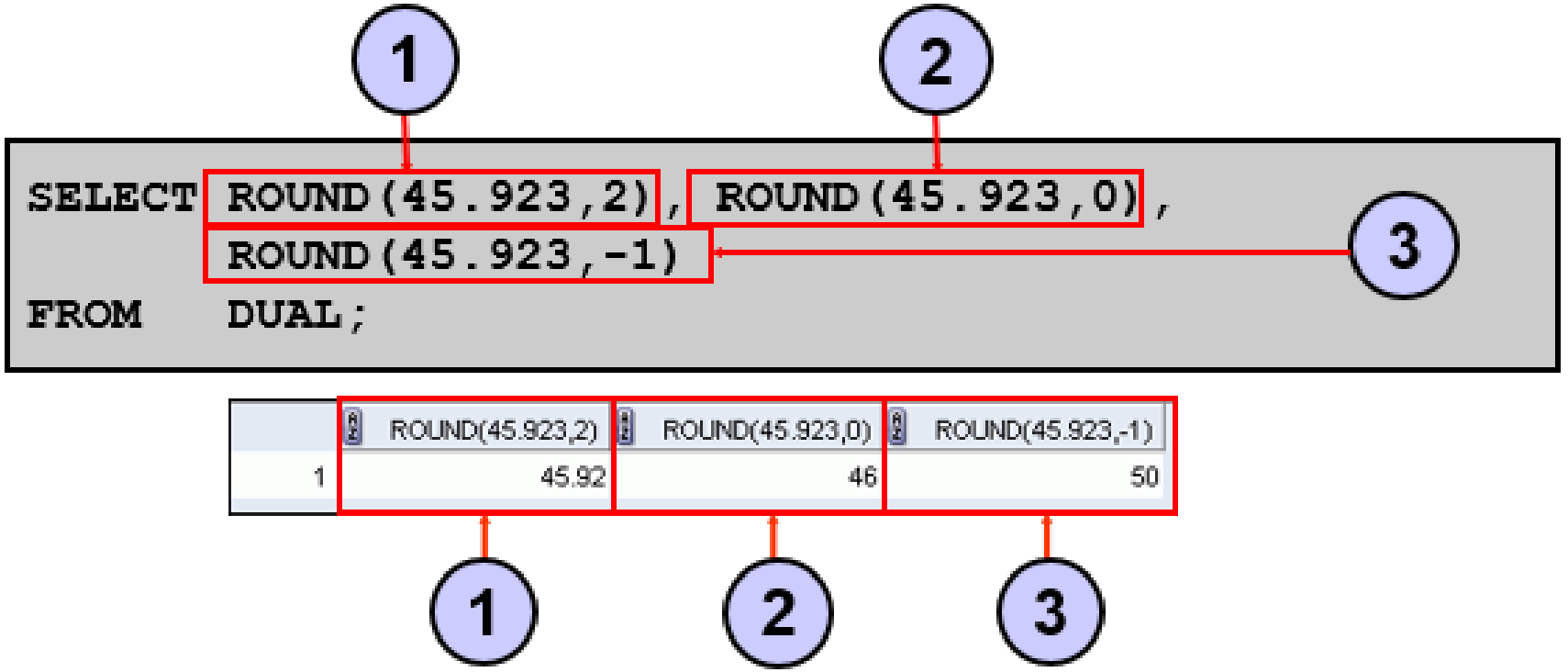
Number Functions

- `ROUND`: Rounds value to a specified decimal
- `TRUNC`: Truncates value to a specified decimal
- `MOD`: Returns remainder of division

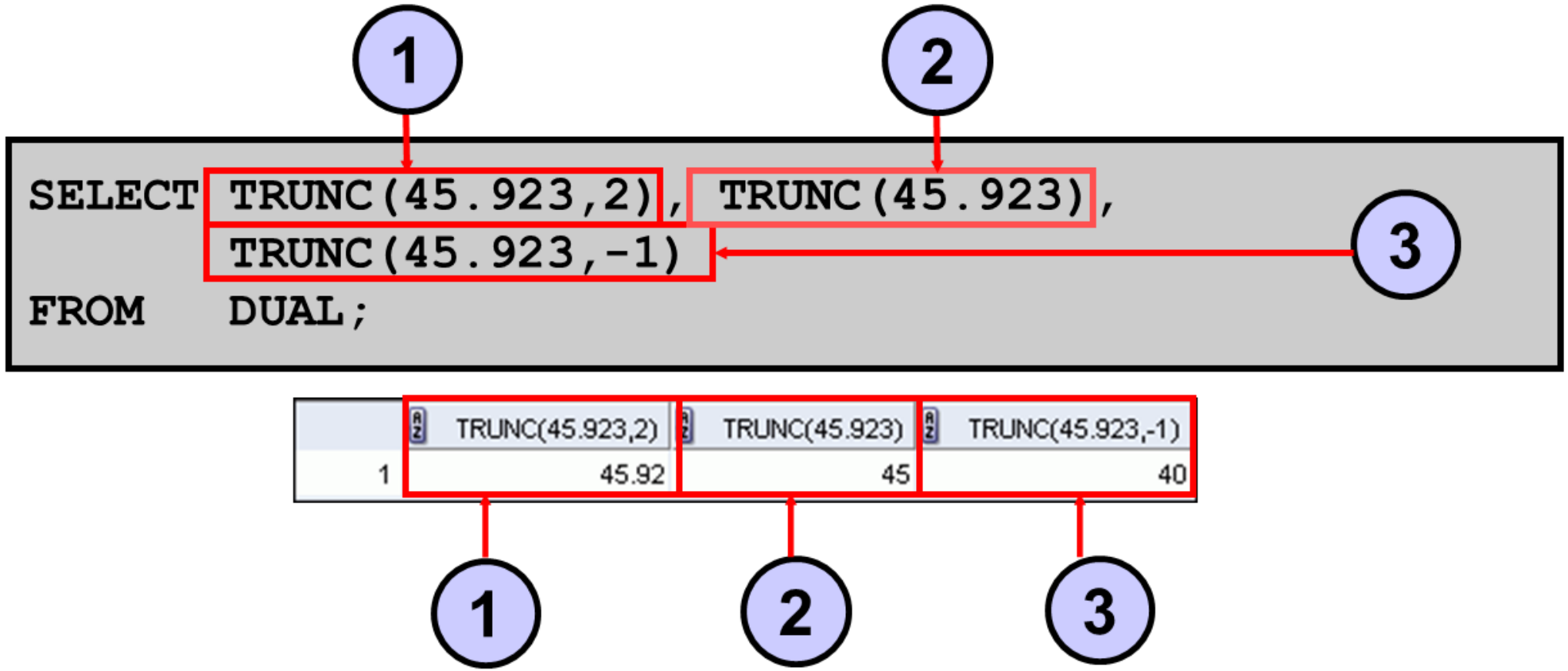
Function	Result
`ROUND(45.926, 2)`	`45.93`
`TRUNC(45.926, 2)`	`45.92`
`MOD(1600, 300)`	`100`

Using the ROUND Function



DUAL is a dummy table that you can use to view results from functions and calculations.

Using the TRUNC Function



Using the MOD Function

For all employees with the job title of Sales Representative, calculate the remainder of the salary after it is divided by 5,000.

```
SELECT last_name, salary, MOD(salary, 5000)
FROM   employees
WHERE  job_id = 'SA_REP';
```

	LAST_NAME	SALARY	MOD(SALARY,5000)
1	Abel	11000	1000
2	Taylor	8600	3600
3	Grant	7000	2000

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Using the CURDATE Function

CURDATE() is a function that returns:

- Date

```
SELECT CURDATE ();
```

Using the CURTIME Function

CURTIME() is a function that returns:

- Time

```
SELECT CURTIME();
```

Using the NOW Function

`NOW()` is a function that returns:

- Date
- Time

```
SELECT   NOW();
```

Using the ADDDATE Function

```
SELECT ADDDATE("2017-06-15", INTERVAL 10 Day);
```

Using the ADDDATE Function

```
SELECT ADDDATE("2017-06-15", INTERVAL 10 YEAR);
```

Using the ADDDATE Function

```
SELECT ADDDATE("2017-06-15", INTERVAL 10 month);
```

Using the DATE_SUB Function

```
SELECT DATE_SUB("2017-06-15", INTERVAL 10 DAY);
```

Using the `DATEDIFF` Function

```
SELECT DATEDIFF("2017-06-25", "2010-06-15");
```

```
2567
```

Using the DATE_FORMAT Function

```
SELECT DATE_FORMAT("2017-06-15", "%D");
```

Using the DATE_FORMAT Function

```
SELECT DATE_FORMAT("2017-06-15", "%M");
```

Using the DATE_FORMAT Function

```
SELECT DATE_FORMAT("2017-06-15", "%Y");
```

Date-Manipulation Functions

Function	Result
LAST_DAY	Extract the last day of the month for the given date
DATE_ADD	Add x days to a date and return the date
ADDDATE	Add x days to a date and return the date
DATE_SUB	Subtract x days from a date and return the date
ADDTIME	Add x seconds to a time and return the datetime
DAY	Return the day of the month for a date

Date-Manipulation Functions

Function	Result
DAYOFWEEK	Return the weekday index for a date
DAYOFYEAR	Return the day of the year for a date
EXTRACT(year FROM Attr)	Extract the year from a date
HOUR	Return the hour part of a datetime
MAKEDATE(2017, 175)	Return a date based on a year and a num of days

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Working with Dates

- The database stores dates in an internal numeric format: century, year, month, day, hours, minutes, and seconds.
- The default date display format is DD-MON-RR.

```
SELECT last_name, hire_date
FROM   employees
WHERE  hire_date < '01-FEB-88';
```

	LAST_NAME	HIRE_DATE
1	King	17-JUN-87
2	Whalen	17-SEP-87

Arithmetic with Dates

- Add or subtract a number to or from a date for a resultant date value.
- Subtract two dates to find the number of days between those dates.
- Add hours to a date by dividing the number of hours by 24.

Using Arithmetic Operators with Dates

```
SELECT last_name, (NOW()-hire_date)/7 AS WEEKS
FROM   employees
WHERE  department_id = 90;
```

	LAST_NAME	WEEKS
1	King	1041.168239087301587301587301587301587302
2	Kochhar	923.025381944444444444444444444444444444
3	De Haan	750.168239087301587301587301587301587302