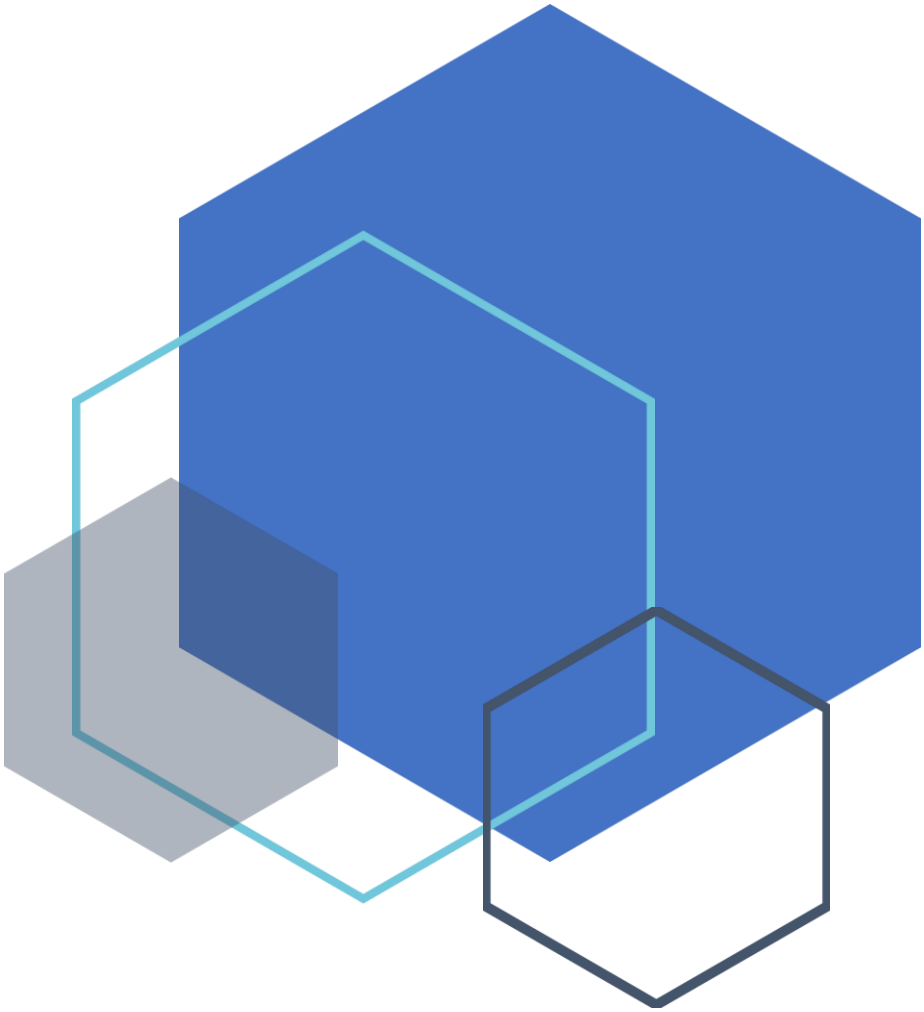

Advanced SQL Puzzles

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https://advancedsqlpuzzles.com/

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Welcome

I hope you enjoy these puzzles as much as I have enjoyed creating them!

As my list of puzzles continues to grow, I have decided to combine the puzzles into one document broken down into two sections.

In the first section, I have 68 of the most challenging puzzles I could create, randomly organized and in no specific order. These are primarily set-based puzzles, interspersed with a small number of puzzles that require knowledge of constraints, specific data types, cursors, loops, etc...

Working through these puzzles will give you an understanding of the SQL language and what types of problems the SQL language solves best. Remember that SQL is a declarative and not an imperative language, and always think in sets when providing a solution.

I collected all the puzzles related to permutations, combinations, and sequences in the second set of puzzles. Solving these puzzles will require a more profound knowledge of your SQL thinking, focusing on such constructs as using recursion or sequence objects to reach the desired output (and, of course, some will require using traditional set-based thinking). Ultimately, these puzzles resolve to creating number tables, which can be used to fill in gaps, create ranges and tallies, provide custom sorting, and allow you to create set-based solutions over iterative solutions. I also included a few puzzles from Part 1 into this set as they ultimately deal with creating a numbers table.

I hope navigating through the GitHub repository to find the solutions is straightforward. The first set of puzzles is combined into one single SQL document, and the second set has a separate folder with individual solutions, as these solutions are a little more involved in solving. For my sanity, it is easiest not to embed the SQL solutions into this text document and instead provide them separately as SQL files in the GitHub repository. If you have any issues navigating the website or GitHub, please contact me and I would be happy to help.

> Answers to these puzzles are located in the following GitHub repository:
> AdvancedSQLPuzzles/Advanced SQL Puzzles

I welcome any corrections, new tricks, new techniques, dead links, misspellings, bugs, and especially any new puzzles that would be an excellent fit for this document.

Please contact me through the contact page on my website or use the discussion board in the GitHub repository.

https://advancedsqlpuzzles.com/

Happy coding!

PART I

Thinking in Sets

Puzzle #1

Shopping Carts

You are tasked with providing an audit of two shopping carts.

Write an SQL statement to transform the following tables into the expected output.

Item
Sugar
Bread
Juice
Soda
Flour

Item
Sugar
Bread
Butter
Cheese
Fruit

Here is the expected output.

Item Cart 1	Item Cart 2
Sugar	Sugar
Bread	Bread
Juice	
Soda	
Flour	
	Butter
	Cheese
	Fruit

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #2

Managers and Employees

Given the following hierarchical table, write an SQL statement that determines the level of depth each employee has from the president.

Employee ID	Manager ID	Job Title
1001		President
2002	1001	Director
3003	1001	Office Manager
4004	2002	Engineer
5005	2002	Engineer
6006	2002	Engineer

Here is the expected output.

Employee ID	Manager ID	Job Title	Depth
1001		President	0
2002	1001	Director	1
3003	1001	Office Manager	1
4004	2002	Engineer	2
5005	2002	Engineer	2
6006	2002	Engineer	2

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #3

Fiscal Year Pay Rates

For each standard fiscal year, a record exists for each employee that states their current pay rate for the specified year.

Can you determine all the constraints that can be applied to this table to ensure it contains only correct information? Assume that no pay raises are given mid-year. There are quite a few of them, so think carefully.

```
CREATE TABLE #EmployeePayRecord
(
EmployeeID INTEGER
FiscalYear INTEGER,
StartDate  DATE,
EndDate    DATE,
PayRate    MONEY
);
```

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #4

Two Predicates

Write an SQL statement given the following requirements.

For every customer that had a delivery to California, provide a result set of the customer orders that were delivered to Texas.

Customer ID	Order ID	Delivery State	Amount
1001	1	CA	$340
1001	2	TX	$950
1001	3	TX	$670
1001	4	TX	$860
2002	5	WA	$320
3003	6	CA	$650
3003	7	CA	$830
4004	8	TX	$120

Here is the expected output.

Customer ID	Order ID	Delivery State	Amount
1001	2	TX	$950
1001	3	TX	$670
1001	4	TX	$860

- Customer ID 1001 would be in the expected output as this customer had deliveries to both California and Texas.
- Customer ID 3003 would not appear in the result set as they did not have a delivery to Texas.
- Customer ID 4004 would not appear in the result set as they did not have a delivery to California.

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #5

Phone Directory

Your customer phone directory table allows individuals to set up a home, cellular, or work phone number.

Write an SQL statement to transform the following table into the expected output.

Customer ID	Type	Phone Number
1001	Cellular	555-897-5421
1001	Work	555-897-6542
1001	Home	555-698-9874
2002	Cellular	555-963-6544
2002	Work	555-812-9856
3003	Cellular	555-987-6541

Here is the expected output.

Customer ID	Cellular	Work	Home
1001	555-897-5421	555-897-6542	555-698-9874
2002	555-963-6544	555-812-9856	
3003	555-987-6541		

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #6

Workflow Steps

Write an SQL statement that determines all workflows that have started but have not been completed.

Workflow	Step Number	Completion Date
Alpha	1	7/2/2018
Alpha	2	7/2/2018
Alpha	3	7/1/2018
Bravo	1	6/25/2018
Bravo	2	
Bravo	3	6/27/2018
Charlie	1	
Charlie	2	7/1/2018

Here is the expected output.

Workflow
Bravo
Charlie

- The expected output would be Bravo and Charlie, as they have a workflow that has started but has not been completed.
- Bonus: Write this query using only the COUNT function with no subqueries. Can you figure out the trick?

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #7

Mission to Mars

You are given the following tables that list the requirements for a space mission and a list of potential candidates.

Write an SQL statement to determine which candidates meet the mission's requirements.

Candidates

Candidate ID	Description
1001	Geologist
1001	Astrogator
1001	Biochemist
1001	Technician
2002	Surgeon
2002	Machinist
2002	Geologist
3003	Geologist
3003	Astrogator
4004	Selenologist

Requirements

Description
Geologist
Astrogator
Technician

Here is the expected output.

Candidate ID
1001

- The expected output would be Candidate ID 1001, as this candidate has all the necessary skills for the space mission.
- Candidate ID 2002 and 3003 would not be in the output as they have some but not all the required skills, and Candidate ID 4004 has none of the needed requirements.

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #8

Workflow Cases

You have a report of all workflows and their case results.

A value of 0 signifies the workflow failed, and a value of 1 signifies the workflow passed.

Write an SQL statement that transforms the following table into the expected output.

Workflow	Case 1	Case 2	Case 3
Alpha	0	0	0
Bravo	0	1	1
Charlie	1	0	0
Delta	0	0	0

Here is the expected output.

Workflow	Passed
Alpha	0
Bravo	2
Charlie	1
Delta	0

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #9

Matching Sets

Write an SQL statement that matches an employee to all other employees who carry the same licenses.

Employee ID	License
1001	Class A
1001	Class B
1001	Class C
2002	Class A
2002	Class B
2002	Class C
3003	Class A
3003	Class D
4004	Class A
4004	Class B
4004	Class D
5005	Class A
5005	Class B
5005	Class D

Here is the expected output.

Employee ID	Employee ID	Count
1001	2002	3
2002	1001	3
4004	5005	3
5005	4004	3

- Employee IDs 1001 and 2002 would be in the expected output as they both carry a Class A, Class B, and a Class C license.
- Employee IDs 4004 and 5005 would be in the expected output as they both carry a Class A, Class B, and a Class D license.
- Although Employee ID 3003 has the same licenses as Employee ID 4004 and 5005, these Employee IDs do not have the same license as Employee ID 3003.

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #10

Mean, Median, Mode, and Range

- The mean is the average of all numbers.
- The median is the middle number in a sequence of numbers.
- The mode is the number that occurs most often within a set of numbers.
- The range is the difference between the largest and smallest values in a set of numbers.

Write an SQL statement to determine the mean, median, mode, and range of the set of integers provided in the following DDL statement.

```
CREATE TABLE #SampleData
(
IntegerValue INTEGER
);

INSERT INTO #SampleData
VALUES(5),(6),(10),(10),(13),
(14),(17),(20),(81),(90),(76);
```

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #11

Permutations

You are given the following list of test cases and must determine all possible permutations.

Write an SQL statement that produces the expected output. Ensure your code can account for a changing number of elements without rewriting.

Test Case
A
B
C

Here is the expected output.

Test Cases
A,B,C
A,C,B
B,A,C
B,C,A
C,A,B
C,B,A

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #12

Average Days

Write an SQL statement to determine the average number of days between executions for each workflow.

Workflow	Execution Date
Alpha	6/1/2018
Alpha	6/14/2018
Alpha	6/15/2018
Bravo	6/1/2018
Bravo	6/2/2018
Bravo	6/19/2018
Charlie	6/1/2018
Charlie	6/15/2018
Charlie	6/30/2018

Here is the expected output.

Workflow	Average Days
Alpha	7
Bravo	9
Charlie	14

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #13

Inventory Tracking

You work for a manufacturing company and need to track inventory adjustments from the warehouse.

Some days the inventory increases, on other days the inventory decreases.

Write an SQL statement that will provide a running balance of the inventory.

Date	Quantity Adjustment
7/1/2018	100
7/2/2018	75
7/3/2018	-150
7/4/2018	50
7/5/2018	-100

Here is the expected output.

Date	Quantity Adjustment	Inventory
7/1/2018	100	100
7/2/2018	75	175
7/3/2018	-150	25
7/4/2018	50	75
7/5/2018	-100	-25

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #14

Indeterminate Process Log

Your process log has several workflows broken down by step numbers with the possible status values of Complete, Running, or Error.

Your task is to write an SQL statement that creates an overall status based on the following requirements.

- If all steps of a workflow are of the same status (Error, Complete, or Running), then return the distinct status.
- If any steps of a workflow have an Error status along with a status of Complete or Running, set the overall status to Indeterminate.
- If the workflow steps have a combination of Complete and Running (without any Errors), set the overall status to Running.

Workflow	Step Number	Status
Alpha	1	Error
Alpha	2	Complete
Alpha	3	Running
Bravo	1	Complete
Bravo	2	Complete
Charlie	1	Running
Charlie	2	Running
Delta	1	Error
Delta	2	Error
Echo	1	Running
Echo	2	Complete

Here is the expected output.

Workflow	Status
Alpha	Indeterminate
Bravo	Complete
Charlie	Running
Delta	Error
Echo	Running

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #15

Group Concatenation

Write an SQL statement that can group concatenate the following values.

Sequence	Syntax
1	SELECT
2	Product,
3	UnitPrice,
4	EffectiveDate
5	FROM
6	Products
7	WHERE
8	UnitPrice
9	> 100

Here is the expected output.

Syntax
SELECT Product, UnitPrice, EffectiveDate FROM Products WHERE UnitPrice > 100

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #16

Reciprocals

You work for a software company that released a 2-player game and you need to tally the scores.

Given the following table, write an SQL statement to determine the reciprocals and calculate their aggregate score.

In the data below, players 3003 and 4004 have two valid entries, but their scores need to be aggregated together.

Player A	Player B	Score
1001	2002	150
3003	4004	15
4004	3003	125

Here is the expected output.

Player A	Player B	Score
1001	2002	150
3003	4004	140

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #17

De-Grouping

Write an SQL Statement to de-group the following data.

Product	Quantity
Pencil	3
Eraser	4
Notebook	2

Here is the expected output.

Product	Quantity
Pencil	1
Pencil	1
Pencil	1
Eraser	1
Eraser	1
Eraser	1
Eraser	1
Notebook	1
Notebook	1

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #18

Seating Chart

Given the set of integers provided in the following DDL statement, write the SQL statements to determine the following:

- Gap start and gap ends
- Total missing numbers
- Count of odd and even numbers

```
CREATE TABLE #SeatingChart
(
SeatNumber INTEGER
);

INSERT INTO #SeatingChart VALUES
(7),(13),(14),(15),(27),(28),(29),(30),
(31),(32),(33),(34),(35),(52),(53),(54);
```

Here is the expected output.

Gap Start	Gap End
1	6
8	12
16	26
36	51

Total Missing Numbers
38

Type	Count
Even Numbers	7
Odd Numbers	9

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #19

Back to the Future

Here is one of the more difficult puzzles to solve with a declarative SQL statement.

Write an SQL statement to merge the overlapping time periods.

Start Date	End Date
1/1/2018	1/5/2018
1/3/2018	1/9/2018
1/10/2018	1/11/2018
1/12/2018	1/16/2018
1/15/2018	1/19/2018

Here is the expected output.

Start Date	End Date
1/1/2018	1/9/2018
1/10/2018	1/11/2018
1/12/2018	1/19/2018

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #20

Price Points

Write an SQL statement to determine the current price point for each product.

Product ID	Effective Date	Unit Price
1001	1/1/2018	$1.99
1001	4/15/2018	$2.99
1001	6/8/2018	$3.99
2002	4/17/2018	$1.99
2002	5/19/2018	$2.99

Here is the expected output.

Product ID	Effective Date	Unit Price
1001	6/8/2018	$3.99
2002	5/19/2018	$2.99

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #21

Average Monthly Sales

Write an SQL statement that returns a list of states where customers have an average monthly sales value that is consistently greater than $100.

Order ID	Customer ID	Order Date	Amount	State
1	1001	1/1/2018	$100	TX
2	1001	1/1/2018	$150	TX
3	1001	1/1/2018	$75	TX
4	1001	2/1/2018	$100	TX
5	1001	3/1/2018	$100	TX
6	2002	2/1/2018	$75	TX
7	2002	2/1/2018	$150	TX
8	3003	1/1/2018	$100	IA
9	3003	2/1/2018	$100	IA
10	3003	3/1/2018	$100	IA
11	4004	4/1/2018	$100	IA
12	4004	5/1/2018	$50	IA
13	4004	5/1/2018	$100	IA

Here is the expected output.

State
TX

- Texas would show in the result set as Customer ID 1001 and 2002 each have their average monthly value over $100.
- Iowa would not show in the result set because Customer ID 4004 did not have an average monthly value over $100 in May 2018.

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #22

Occurrences

Write an SQL statement that returns all distinct process log messages and the workflow where the message occurred the most often.

Workflow	Message	Occurrences
Bravo	Error: Cannot Divide by 0	3
Alpha	Error: Conversion Failed	5
Charlie	Error: Conversion Failed	7
Alpha	Error: Unidentified error occurred	9
Bravo	Error: Unidentified error occurred	1
Charlie	Error: Unidentified error occurred	10
Alpha	Status Complete	8
Charlie	Status Complete	6

Here is the expected output.

Workflow	Message	Occurrences
Bravo	Error: Cannot Divide by 0	3
Charlie	Error: Conversion Failed	7
Charlie	Error: Unidentified error occurred	10
Alpha	Status Complete	8

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #23

Divide in Half

You work for a gaming company and need to rank players by their score into two categories.

Players that rank in the top half must be given a value of 1, and the remaining players must be given a value of 2.

Write an SQL statement that meets these requirements.

Player ID	Score
1001	2343
2002	9432
3003	6548
4004	1054
5005	6832

Here is the expected output.

Quartile	Player ID	Score
1	2002	9432
1	3003	6548
1	5005	6832
2	1001	2343
2	4004	1054

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #24

Page Views

Write an SQL statement that retrieves records 5 to 10 ordered by the Order ID column.

Order ID	Customer ID	Order Date	Amount	State
1	1001	1/1/2018	$100	TX
2	3003	1/1/2018	$100	IA
3	1001	3/1/2018	$100	TX
4	2002	2/1/2018	$150	TX
5	1001	2/1/2018	$100	TX
6	4004	5/1/2018	$50	IA
7	1001	1/1/2018	$150	TX
8	3003	3/1/2018	$100	IA
9	4004	4/1/2018	$100	IA
10	1001	1/1/2018	$75	TX
11	2002	2/1/2018	$75	TX
12	3003	2/1/2018	$100	IA
13	4004	5/1/2018	$100	IA

Here is the expected output.

Order ID	Customer ID	Order Date	Amount	State
5	1001	2/1/2018	$100	TX
6	4004	5/1/2018	$50	IA
7	1001	1/1/2018	$150	TX
8	3003	3/1/2018	$100	IA
9	4004	4/1/2018	$100	IA

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #25

Top Vendors

Write an SQL statement that returns the vendor from which each customer has placed the most orders.

Order ID	Customer ID	Count	Vendor
1	1001	12	Direct Parts
2	1001	54	Direct Parts
3	1001	32	ACME
4	2002	7	ACME
5	2002	16	ACME
6	2002	5	Direct Parts

Here is the expected output.

Customer ID	Vendor
1001	Direct Parts
2002	ACME

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #26

Previous Year's Sales

Write an SQL statement that shows the current year's sales, along with the previous year's sales, and the sales from two years ago.

Year	Amount
2018	$352,645
2017	$165,565
2017	$254,654
2016	$159,521
2016	$251,696
2016	$111,894

Here is the expected output.

2018	2017	2016
$352,645	$420,219	$411,217

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #27

Delete the Duplicates

Given the set of integers provided in the following DDL statement, write an SQL statement that deletes the duplicated integers (1 and 3).

```
CREATE TABLE #SampleData
(
IntegerValue INTEGER
);

INSERT INTO #SampleData VALUES
(1),(1),(2),(3),(3),(4);
```

Here is the expected output.

Integer Value
1
2
3
4

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #28

Fill the Gaps

The answer to this problem is often referred to as a data smear or a flash fill.

Write an SQL statement to fill in the missing gaps.

Row Number	Workflow	Status
1	Alpha	Pass
2		Fail
3		Fail
4		Fail
5	Bravo	Pass
6		Fail
7		Fail
8		Pass
9		Pass
10	Charlie	Fail
11		Fail
12		Fail

Here is the expected output.

Row Number	Workflow	Status
1	Alpha	Pass
2	Alpha	Fail
3	Alpha	Fail
4	Alpha	Fail
5	Bravo	Pass
6	Bravo	Fail
7	Bravo	Fail
8	Bravo	Pass
9	Bravo	Pass
10	Charlie	Fail
11	Charlie	Fail
12	Charlie	Fail

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #29

Count the Groupings

Write an SQL statement that counts the consecutive values in the Status column.

Step Number	Status
1	Passed
2	Passed
3	Passed
4	Passed
5	Failed
6	Failed
7	Failed
8	Failed
9	Failed
10	Passed
11	Passed
12	Passed

Here is the expected outcome.

Min Step Number	Max Step Number	Status	Consecutive Count
1	4	Passed	4
5	9	Failed	5
10	12	Passed	3

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #30

Select Star

Your developers have many bad practices; the worst of them being they routinely deploy procedures that do not explicitly define which columns to return in their SELECT clause.

Modify the following table in such a way that the statement **`SELECT * FROM Products`** will return an error when executed.

```
CREATE TABLE #Products
(
ProductID     INTEGER PRIAMRY KEY,
ProductName   VARCHAR(MAX)
);
```

Answers to the puzzles are located in the following GitHub repository.
[AdvancedSQLPuzzles/Advanced SQL Puzzles]

Puzzle #31

Second Highest

Given the set of unique integers in the following DDL statement, how many different SQL statements can you write that will return the second-highest integer?

```
CREATE TABLE #SampleData
(
IntegerValue INTEGER PRIMARY KEY
);

INSERT INTO #SampleData VALUES
(3759),(3760),(3761),(3762),(3763);
```

Here is the expected output.

Integer Value
3762

Bonus

How would you construct an SQL query to retrieve the second highest salary (a non-unique value) from a dataset? The result will show $150,000.

Name	Salary
Carl Friedrich Gauss	$250,000
Evariste Galois	$250,000
Pierre-Simon Laplace	$150,000
Sophie Germain	$150,000
Leonhard Euler	$100,000

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #32

First and Last

Write an SQL statement that determines the most and least experienced Spaceman ID by their job description.

Spaceman ID	Job Description	Mission Count
1001	Astrogator	6
2002	Astrogator	12
3003	Astrogator	17
4004	Geologist	21
5005	Geologist	9
6006	Geologist	8
7007	Technician	13
8008	Technician	2
9009	Technician	7

Here is the expected output.

Job Description	Most Experienced	Least Experienced
Astrogator	3003	1001
Geologist	4004	6006
Technician	7007	8008

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #33

Deadlines

You are employed by a company specializing in manufacturing various light bulbs. Each bulb is composed of distinct components, each requiring a specific number of days for production, and these components can be constructed independently.

Your task is to analyze a table of orders with their respective requested delivery dates and ascertain whether each order can be completed and assembled by the specified delivery date.

Orders

Order ID	Component	Days to Deliver
1	Aurora	7
2	Twilight	3
3	SunRay	9

Manufacturing Time

Product	Component	Days to Manufacture
Aurora	Photon Coil	7
Aurora	Filament	2
Aurora	Shine Capacitor	3
Aurora	Glow Sphere	1
Twilight	Photon Coil	7
Twilight	Filament	2
SunRay	Shine Capacitor	3
SunRay	Photon Coil	1

Here is the expected output.

Order ID	Product	Days to Build	Days to Deliver	Schedule
1	Aurora	7	7	On Schedule
2	Twilight	7	3	Behind Schedule
3	SunRay	3	9	Ahead of Schedule

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #34

Specific Exclusion

Write an SQL statement that returns all rows except where the Customer ID is 1001 and the Amount is $50.

Order ID	Customer ID	Amount
1	1001	$25
2	1001	$50
3	2002	$65
4	3003	$50

Here is the expected output.

Order ID	Customer ID	Amount
1	1001	$25
3	2002	$65
4	3003	$50

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #35

International vs. Domestic Sales

You work in a sales office that sells widgets both domestically and internationally.

Write an SQL statement that shows all sales representatives who either had a domestic sale or an international sale, but not both.

Invoice ID	Sales Rep ID	Amount	Sales Type
1	1001	$13,454	International
2	2002	$3,434	International
3	4004	$54,645	International
4	5005	$234,345	International
5	7007	$776	International
6	1001	$4,564	Domestic
7	2002	$34,534	Domestic
8	3003	$345	Domestic
9	6006	$6,543	Domestic
10	8008	$67	Domestic

Here is the expected output.

Sales Rep ID
3003
4004
5005
6006

- Sales Rep IDs 3003, 4004, 5005, and 6006 would appear in the result set as they had either an international sale or a domestic sale, but not both.

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #36

Traveling Salesman

Here is a well-known problem that is called the Traveling Salesman.

Write an SQL statement that shows all the possible routes from Austin to Des Moines. Which route is the most expensive? Which route is the least expensive?

Note the data represents a cyclic graph.

Route ID	Departure City	Arrival City	Cost
1	Austin	Dallas	$100
1	Dallas	Austin	$100
2	Dallas	Memphis	$200
2	Memphis	Dallas	$200
3	Memphis	Des Moines	$300
3	Des Moines	Memphis	$300
4	Dallas	Des Moines	$400
4	Des Moines	Dallas	$400

Here is the expected output.

Route Path	Total Cost
Austin --> Dallas --> Des Moines	$500
Austin --> Dallas --> Memphis --> Des Moines	$600

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #37

Group Criteria Keys

Write an SQL statement that provides a key based upon the distinct combination of the columns Distributor, Facility, and Zone.

Order ID	Distributor	Facility	Zone	Amount
1	ACME	123	ABC	$100
2	ACME	123	ABC	$75
3	Direct Parts	789	XYZ	$150
4	Direct Parts	789	XYZ	$125

Here is the expected output.

Criteria ID	Order ID	Distributor	Facility	Zone	Amount
1	1	ACME	123	ABC	$100
1	2	ACME	123	ABC	$75
2	3	Direct Parts	789	XYZ	$150
2	4	Direct Parts	789	XYZ	$125

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #38

Reporting Elements

You must provide a report of all distributors and their sales by region. If a distributor did not have any sales for a region, provide a zero-dollar value for that day. Assume there is at least one sale for each region.

Region	Distributor	Sales
North	ACE	10
South	ACE	67
East	ACE	54
North	ACME	65
South	ACME	9
East	ACME	1
West	ACME	7
North	Direct Parts	8
South	Direct Parts	7
West	Direct Parts	12

Here is the expected output.

Region	Distributor	Sales
North	ACE	10
South	ACE	67
East	ACE	54
West	ACE	0
North	ACME	65
South	ACME	9
East	ACME	1
West	ACME	7
North	Direct Parts	8
South	Direct Parts	7
East	Direct Parts	0
West	Direct Parts	12

- In the result set, Ace and Direct Parts each have a fabricated record with 0 sales.

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #39

Prime Numbers

A prime number is a natural number greater than one that has no positive divisors other than one and itself.

Write an SQL statement to determine which of the integers provided in the following DDL statement are prime numbers.

```
CREATE TABLE #PrimeNumbers
(
IntegerValue INTEGER PRIMARY KEY
);

INSERT INTO #PrimeNumbers VALUES
(1),(2),(3),(4),(5),(6),(7),(8),(9),(10);
```

Here is the expected output.

Integer Value
2
3
5
7

Answers to the puzzles are located in the following GitHub repository.
[AdvancedSQLPuzzles/Advanced SQL Puzzles]

Puzzle #40

Sort Order

Write an SQL statement that sorts the following values into the expected output. Can you find the most elegant solution?

City
Atlanta
Baltimore
Chicago
Denver

Here is the expected output.

City
Baltimore
Denver
Atlanta
Chicago

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #41

Associate IDs

The following table shows two hierarchical structures.

1. The first is the association between Anne, Betty, Charles, Dan, and Emma.
2. The second is the association between Francis, George, and Harriet.

Write an SQL statement that creates a grouping number for each hierarchical association and display the member in the associations.

Associate 1	Associate 2
Anne	Betty
Anne	Charles
Betty	Dan
Charles	Emma
Francis	George
George	Harriet

Here is the expected output.

Grouping	Associate
1	Anne
1	Betty
1	Charles
1	Dan
1	Emma
2	Francis
2	George
2	Harriet

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #42

Mutual Friends

The following table shows a cyclic data structure.

Given the following list of friend connections, determine the number of mutual connections between the friends.

Friend 1	Friend 2
Jason	Mary
Mike	Mary
Mike	Jason
Susan	Jason
John	Mary
Susan	Mary

Here is the expected output.

Friend 1	Friend 2	Mutual Friends
Jason	Mary	2
John	Mary	0
Jason	Mike	1
Mary	Mike	1
Jason	Susan	1
Mary	Susan	1

- Jason and Mary have 2 mutual friends: Mike and Susan.
- John and Mary have 0 mutual friends.
- Jason and Mike have 1 mutual friend: Mary.
- etc……..

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #43

Unbounded Preceding

Determine the minimum quantity for each record between the current row and all previous rows for each Customer ID.

Order ID	Customer ID	Quantity
1	1001	5
2	1001	8
3	1001	3
4	1001	7
1	2002	4
2	2002	9

Here is the expected output.

Order ID	Customer ID	Quantity	Min Value
1	1001	5	5
2	1001	8	5
3	1001	3	3
4	1001	7	3
1	2002	4	4
2	2002	9	4

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #44

Slowly Changing Dimension Part I

Give the following table, write an SQL statement to create a Type 2 Slowly Changing Dimension.

Customer ID	Balance Date	Amount
1001	10/11/2021	$54.32
1001	10/10/2021	$17.65
1001	9/18/2021	$65.56
1001	9/12/2021	$56.23
1001	9/1/2021	$42.12
2002	10/15/2021	$46.52
2002	10/13/2021	$7.65
2002	9/15/2021	$75.12
2002	9/10/2021	$47.34
2002	9/2/2021	$11.11

Here is the expected output.

Customer ID	Start Date	End Date	Amount
1001	10/11/2021	12/31/9999	$54.32
1001	10/10/2021	10/10/2021	$17.65
1001	9/18/2021	10/9/2021	$65.56
1001	9/12/2021	9/17/2021	$56.23
1001	9/1/2021	9/11/2021	$42.12
2002	10/15/2021	12/31/9999	$46.52
2002	10/13/2021	10/14/2021	$7.65
2002	9/15/2021	10/12/2021	$75.12
2002	9/10/2021	9/14/2021	$47.34
2002	9/2/2021	9/9/2021	$11.11

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #45

Slowly Changing Dimension Part II

Given the following table with overlapping timeframes. Write an SQL statement to identify the overlapping records.

Customer ID	Start Date	End Date	Amount
1001	10/11/2021	12/31/9999	$54.32
1001	10/10/2021	10/10/2021	$17.65
1001	9/18/2021	10/12/2021	$65.56
2002	9/12/2021	9/17/2021	$56.23
2002	9/1/2021	9/17/2021	$42.12
2002	8/15/2021	8/31/2021	$16.32

Here is the expected output.

Customer ID	Start Date	End Date	Amount
1001	9/18/2021	10/12/2021	$65.56
2002	9/1/2021	9/17/2021	$42.12

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #46

Negative Account Balances

How many different SQL statements can you write to determine all accounts whose balance has never been positive?

Account ID	Balance
1001	$234.45
1001	$-23.12
2002	$-93.01
2002	$-120.19
3003	$186.76
3003	$90.23
3003	$10.11

Here is the expected output.

Account ID
2002

- Account ID 2002 would appear in the result set as this account has never had a positive balance.
- There are a multitude of ways to write this statement, can you think of them all?

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #47

Work Schedule

Given a table of employee shifts, and another table of their activities, merge the two tables and write an SQL statement that produces the desired output. If an employee is scheduled and does not have an activity planned, label the time frame as “Work”.

Schedule

Schedule ID	Start Time	End Time
A	10/1/2021 10:00	10/1/2021 15:00
B	10/1/2021 10:15	10/1/2021 12:15

Activity

Schedule ID	Activity	Start Time	End Time
A	Meeting	10/1/2021 10:00	10/1/2021 10:30
A	Break	10/1/2021 12:00	10/1/2021 12:30
A	Meeting	10/1/2021 13:00	10/1/2021 13:30
B	Break	10/1/2021 11:00	10/1/2021 11:15

Here is the expected output.

Schedule ID	Activity	Start Time	End Time
A	Meeting	10/1/2021 10:00	10/1/2021 10:30
A	Work	10/1/2021 10:30	10/1/2021 12:00
A	Break	10/1/2021 12:00	10/1/2021 12:30
A	Work	10/1/2021 12:30	10/1/2021 13:00
A	Meeting	10/1/2021 13:00	10/1/2021 13:30
A	Work	10/1/2021 13:30	10/1/2021 15:00
B	Work	10/1/2021 10:15	10/1/2021 11:00
B	Break	10/1/2021 11:00	10/1/2021 11:15
B	Work	10/1/2021 11:15	10/1/2021 12:15

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #48

Consecutive Sales

For the following Customer IDs, write an SQL statement to determine customers that had a sale in the current year, plus the previous two consecutive years.

You will need to adjust the test data for the current year, as the test data is coded for the year 2021.

Sales ID	Year
1001	2018
1001	2019
1001	2020
2002	2020
2002	2021
3003	2018
3003	2020
3003	2021
4004	2019
4004	2020
4004	2021

Here is the expected output.

Sales ID
4004

- Sales ID 4004 would be in the expected output as this customer had a sale in the current year, plus the previous two years.

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #49

Sumo Wrestlers

A group of Sumo wrestlers are forming a line to board an elevator. Unfortunately, the elevator can only hold 2,000 pounds and not all Sumo wrestlers can board. Which Sumo wrestler would be the last to enter given the following queue order?

Line Order	Name	Weight
1	Haruto	611
2	Minato	533
3	Haruki	623
4	Sota	569
5	Aoto	610
6	Hinata	525

Here is the expected output.

Name
Haruki

- The expected output would be Haruki, as this is the last Sumo wrestler to fit in the elevator before the 2,000-pound maximum capacity is reached.

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #50

Baseball Balls and Strikes

For this puzzle, you will need to understand the rules of baseball's balls and strike count.

Given a table containing the columns Batter ID, Pitch Number and Result for each pitch. Construct an SQL statement that returns Start Of Pitch Count and End Of Pitch Count.

Batter ID	Pitch Number	Result	Start Of Pitch Count	End Of Pitch Count
1001	1	Foul	0 – 0	0 – 1
1001	2	Foul	0 – 1	0 – 2
1001	3	Ball	0 – 2	1 – 2
1001	4	Ball	1 – 2	2 – 2
1001	5	Strike	2 – 2	2 – 3
2002	1	Ball	0 – 0	1 – 0
2002	2	Strike	1 – 0	1 – 1
2002	3	Foul	1 – 1	1 – 2
2002	4	Foul	1 – 2	1 – 2
2002	5	Foul	1 – 2	1 – 2
2002	6	In Play	1 – 2	In-Play
3003	1	Ball	0 – 0	1 – 0
3003	2	Ball	1 – 0	2 – 0
3003	3	Ball	2 – 0	3 – 0
3003	4	Ball	3 – 0	4 – 0
4004	1	Foul	0 – 0	0 – 1
4004	2	Foul	0 – 1	0 – 2
4004	3	Foul	0 – 2	0 – 2
4004	4	Foul	0 – 2	0 – 2
4004	5	Foul	0 – 2	0 – 2
4004	6	Strike	0 – 2	0 – 3

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #51

Primary Key Creation

Given the following table whose natural key is a combination of the columns Assembly ID and Part, use the HASHBYTES and CHECKSUM functions to create two new columns that can be used as primary keys.

The goal here is to create a single column that is unique and re-creatable. The benefit of creating a hashbytes or checksum column is to aid in data profiling and integrity checks when a table contains a multitude of columns that form the natural key (and some of these columns can be NULL).

Assembly ID	Part
1001	Bolt
1001	Screw
2002	Nut
2002	Washer
3003	Toggle
3003	Bolt

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #52

Phone Numbers Table

You are creating a table that customer agents will use to enter customer phone numbers.

Create a table with the columns Customer ID and Phone Number, where the Phone Number column must be inserted with the format (999)-999-9999.

Agents will enter phone numbers into this table via a form, and it is imperative that phone numbers are formatted correctly when inputted. Create a table that meets these requirements.

Here are a few sample records.

Customer ID	Phone Number
1001	(555)-555-5555
2002	(555)-555-5555
3003	(555)-555-5555

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #53

Spouse IDs

You are given the following table of individuals and their spouse. Every individual exists both as a Primary ID and a Spouse ID. You need to create a group criteria key to match the associated records.

Primary ID	Spouse ID
Pat	Charlie
Jordan	Casey
Ashley	Dee
Charlie	Pat
Casey	Jordan
Dee	Ashley

Here is the expected output.

Group ID	Primary ID	Spouse ID
1	Ashley	Dee
1	Dee	Ashley
2	Jordan	Casey
2	Casey	Jordan
3	Charlie	Pat
3	Pat	Charlie

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #54

Winning the Lottery

You are part of an office lottery pool where you keep a table of the winning lottery numbers along with a table of each ticket's chosen numbers. If a ticket has some but not all the winning numbers, you win $10. If a ticket has all the winning numbers, you win $100. Calculate the total winnings for today's drawing.

Winning Numbers

Number
25
45
78

Tickets

Ticket ID	Number
AAA	25
AAA	45
AAA	78
BBB	25
BBB	45
BBB	98
CCC	67
CCC	86
CCC	91

Here is the expected output.

Amount
$110

- The expected output would be $110, as you have one winning ticket with all the winning numbers, and one ticket that has some but not all the winning numbers.

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #55

Table Audit

Conduct an audit on the following tables to identify products and their corresponding quantities that are either matching or unique to each table, and generate the expected output listed below.

Products A

Product Name	Quantity
Widget	7
Doodad	9
Gizmo	3

Products B

Product Name	Quantity
Widget	7
Doodad	6
Dingbat	9

Here is the expected output.

Type	ProductName
Matches in both table A and table B	Widget
Product does not exist in table A	Dingbat
Product does not exist in table B	Gizmo
Quantity in table A and table B do not match	Doodad

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #56

Numbers Using Recursion

Create a numbers table using a recursive query.

Here is the expected output.

Number
1
2
3
4
5
6
7
8
9
10

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #57

Find the Spaces

Given the following table containing SQL statements, write an SQL statement that displays the following summary.

Statement
SELECT EmpID FROM Employees;
SELECT * FROM Transactions;

Here is the expected output.

Row Number	Quote ID	String	Starts	Ends	Word
1	1	SELECT EmpID FROM Emps;	1	6	SELECT
2	1	SELECT EmpID FROM Emps;	8	12	EmpID
3	1	SELECT EmpID FROM Emps;	14	17	FROM
4	1	SELECT EmpID FROM Emps;	19	28	Employees;
1	2	SELECT * FROM Trans;	1	6	SELECT
2	2	SELECT * FROM Trans;	8	8	*
3	2	SELECT * FROM Trans;	10	13	FROM
4	2	SELECT * FROM Trans;	15	27	Transactions;

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #58

Add Them Up

You are given the following table, which contains a VARCHAR column that contains mathematical equations. Sum the equations and provide the answers in the output.

Equation
123
1+2+3
1+2-3
1+23
1-2+3
1-2-3
1-23
12+3
12-3

Here is the expected output.

Permutation	Sum
123	123
1+2+3	6
1+2-3	0
1+23	24
1-2+3	2
1-2-3	-4
1-23	-22
12+3	15
12-3	9

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #59

Balanced String

Given a string containing parentheses, brackets, and braces, determine if the string is a balanced string.

A balanced string must have an opening symbol, a corresponding closing symbol, and the symbols appear in the correct order.

For example, the string "([])" is balanced because the opening square bracket is followed by the closing square bracket, and the opening parenthesis is followed by the closing parenthesis, and they are in the correct order. However, the string "([)]" is not balanced because the closing parenthesis appears before the closing square bracket.

Can you discover an efficient algorithm for determining whether a given string is balanced or not?

ID	String
1	()
2	[]
3	{}
4	(({[]}))
5	()[]
6	({})
7	({)}
8	({}}}}()
9	}{()][

Here is the expected output.

ID	String	Outcome
1	()	Balanced
2	[]	Balanced
3	{}	Balanced
4	(({[]}))	Balanced
5	()[]	Balanced
6	({})	Balanced
7	({)}	Unbalanced
8	({}}}}()	Unbalanced
9	}{()][	Unbalanced

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #60

Products Without Duplicates

Given the below products table, return a result set of all product codes not associated with multiple products.

Product	Product Code
Alpha	01
Alpha	02
Bravo	03
Bravo	04
Charlie	02
Delta	01
Echo	EE
Foxtrot	EE
Gulf	GG

Here is the expected output.

Product Code
EE
GG

- The result set will contain the Product Codes of EE and GG as Product Codes 01, 02, 03, and 04 are associated with Alpha and Bravo, which have multiple entries.

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #61

Player Scores

In this SQL puzzle, your task is to analyze a dataset of players' scores across multiple attempts. For each player, you need to calculate two key differences: the change in score from their first attempt to the current record, and the change from their last attempt to the current record. A record should be flagged as "improved" if the player's score has increased from their previous attempt or if it's their first attempt. Additionally, determine if a player has shown consistent improvement across all attempts. If so, mark them as "overall improved."

Attempt ID	Player ID	Score
1	1001	2
2	1001	7
3	1001	8
1	2002	6
2	2002	9
3	2002	7

Here is the expected output.

Attempt ID	Player ID	Score	Difference First	Difference Last	Is Previous Score Lower	Is Overall Improved
1	1001	2	0	-6	1	1
2	1001	7	5	-1	1	1
3	1001	8	6	0	1	1
1	2002	6	0	-1	1	0
2	2002	9	3	2	1	0
3	2002	7	1	0	0	0

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #62

Car and Boat Purchase

You won the lottery and want to buy both a car and a boat. However, the car must be $200,000 more than the boat. What are your options given the following vehicles?

Vehicle ID	Type	Model	Price
1	Car	Rolls-Royce Phantom	$460,000
2	Car	Cadillac CT5	$39,000
3	Car	Porsche Boxster	$63,000
4	Car	Lamborghini Spyder	$290,000
5	Boat	Malibu	$210,000
6	Boat	ATX 22-S	$85,000
7	Boat	Sea Ray SLX	$520,000
8	Boat	Mastercraft	$25,000

Here is the expected outcome.

Car	Boat
Lamborghini Spyder	ATX 22-S
Lamborghini Spyder	Mastercraft
Rolls-Royce Phantom	ATX 22-S
Rolls-Royce Phantom	Malibu
Rolls-Royce Phantom	Mastercraft

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #63

Promotion Codes

Identify all orders linked to a single product with a "PROMO" discount value. If an order is associated with multiple products or multiple discounts, it should not be included in the result.

Order ID	Product	Discount
1	Item 1	PROMO
1	Item 1	PROMO
1	Item 1	MARKDOWN
1	Item 2	PROMO
2	Item 2	
2	Item 3	MARKDOWN
2	Item 3	
3	Item 1	PROMO
3	Item 1	PROMO
3	Item 1	PROMO

Here is the expected output.

Order ID
3

- Order ID 3 meets these criteria because it has a connection to only one product. Item 1, and all the products linked to it have a discount value of "PROMO". On the other hand, Order ID 1 does not meet the criteria as it is linked to two different products.

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #64

Between Quotes

Given the following table of strings that have embedded quotes, return the result based on the following:

1. If the string has more than two quotes, or has zero quotes, return “Error”.
2. If the string has two quotes and more than 10 characters between the quotes, return “True”.
3. If the string has two quotes and less than or equal to 10 characters between the quotes, return “False”.

ID	String	Result
1	"12345678901234"	True
2	1"2345678901234"	True
3	123"45678"901234"	Error
4	123"45678901234"	True
5	12345678901"234"	False
6	12345678901234	Error

Here is the expected output.

ID	String	Result
1	"12345678901234"	True
2	1"2345678901234"	True
3	123"45678"901234"	Error
4	123"45678901234"	True
5	12345678901"234"	False
6	12345678901234	Error

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #65

Home Listings

You are presented with a dataset of home listings, each with a unique Home ID and a Status. Your objective is to assign a grouping key to each record based on specific conditions. A new grouping key should be initiated every time a record has the status “New Listing” or “Relisted”. Each subsequent record, following either of these statuses, should inherit the same grouping key until the next occurrence of “New Listing” or “Relisted”.

Listing ID	Home ID	Status
1	Home A	New Listing
2	Home A	Pending
3	Home A	Relisted
4	Home B	New Listing
5	Home B	Under Contract
6	Home B	Relisted
7	Home C	New Listing
8	Home C	Under Contract
9	Home C	Closed

Here is the expected output.

Listing ID	Home ID	Status	Grouping ID
1	Home A	New Listing	1
2	Home A	Pending	1
3	Home A	Relisted	2
4	Home B	New Listing	3
5	Home B	Under Contract	3
6	Home B	Relisted	4
7	Home C	New Listing	5
8	Home C	Under Contract	5
9	Home C	Closed	5

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #66

Matching Parts

You are working with a dataset of manufactured parts, each having a unique serial number and categorized as either a bolt, washer, or nut. The challenge is to group these parts into sets based on their manufacture day, ensuring that the earliest manufactured parts are grouped first.

Serial #	Manufacture Day	Product
A111	1	Bolt
B111	3	Bolt
C111	5	Bolt
D222	2	Washer
E222	4	Washer
F222	6	Washer
G333	3	Nut
H333	5	Nut
I333	7	Nut

Here is the expected output.

Bolt	Washer	Nut
A111	D222	G333
B111	E222	H333
C111	F222	I333

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #67

Matching Birthdays

Given the following dataset, find the students that share the same birthday.

Student	Birthday#
Susan	04/15/2015
Tim	04/15/2015
Jacob	04/15/2015
Earl	02/05/2015
Mike	05/23/2015
Angie	05/23/2015
Jenny	11/19/2015
Michelle	12/12/2015
Aaron	12/18/2015

Here is the expected output.

Birthday	Students
04/15/2015	Susan, Tim, Jacob
05/23/2015	Mike, Angie

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #68

Removing Outliers

In this puzzle, you have a dataset listing performance scores of different teams by year. Your task involves identifying and removing the most significant outlier from each team's yearly performance score. The outlier is defined as the performance score with the greatest deviation from the team's average score prior to removing any outliers. This outlier could be either the highest or the lowest performance score. Once the outlier is removed, calculate the average score for each team.

Team	Year	Score
Cougars	2015	50
Cougars	2016	45
Cougars	2017	65
Cougars	2018	92
Bulldogs	2015	65
Bulldogs	2016	60
Bulldogs	2017	58
Bulldogs	2018	12

Here is the expected output.

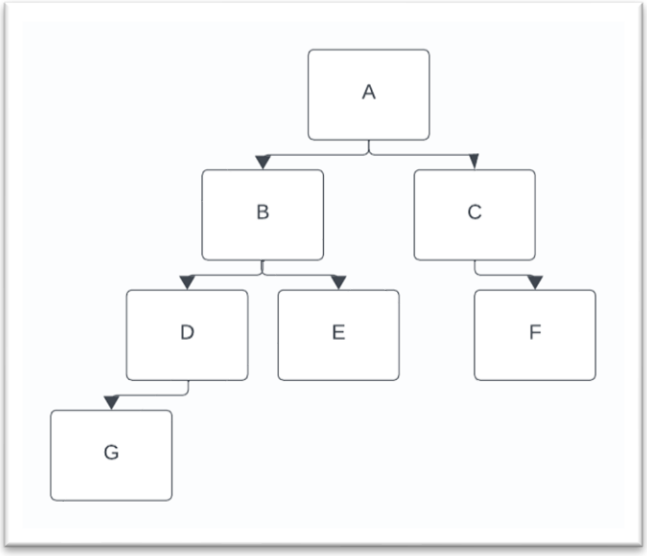
Team	Score
Cougars	53
Bulldogs	61

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #69

Splitting a Hierarchy

You are given the following unbalanced hierarchical structure and must split the branches into two groups, “Group A” and “Group B”.



Here is the expected output.

Group	ID
Group A	A
Group A	B
Group A	D
Group A	E
Group A	G
Group B	A
Group B	C
Group B	F

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #70

Student Facts

You have access to a database containing student enrollment information for a school. Your goal is to create the summary statistics provided below.

Parent ID	Child ID	Age	Gender
1001	A	8	M
1001	B	12	F
2002	C	7	F
2002	D	9	F
2002	E	14	M
3003	F	12	F
3003	G	14	M
4004	H	7	M

Here is the expected output.

Parent ID	Number Children	Average Age	Age Difference	Largest Age Gap	Youngest Age	Oldest Age	Genders
1001	2	10	4	4	8	12	M, F
2002	3	10	7	5	7	14	F, F, M
3003	2	13	2	2	12	14	F, M
4004	1	7			7	7	M

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #71

Employee Validation

Due to a suboptimal database design by the database architecture team, employee records are split across two separate tables: one for temporary employees and another for permanent employees. You are faced with the following challenges.

1. Ensure that an employee is not simultaneously listed in both the Temporary and Permanent employee tables. An INSERT into the Temporary or Permanent tables should fail if this criteria is not met.

2. Confirm that any employee added to either the Temporary or Permanent table has a corresponding entry in the main Employees table. An INSERT into the Temporary or Permanent table should fail if this criteria is not met.

Temporary Employees

Employee ID	Department
1001	Engineering
2002	Sales
3003	Marketing

Permanent Employees

Employee ID	Department
4004	Marketing
5005	Accounting
6006	Accounting

Employees

Employee ID	Name
1001	John
2002	Eric
3003	Jennifer
4004	Bob
5005	Stuart
6006	Angie

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #72

Under Warranty

Your laptop repair shop offers a 30-day warranty on its repair services. From the following dataset, you need to determine all rework that falls under warranty.

Repair ID	Customer ID	Repair Date
1001	A	01/01/2023
2002	A	01/15/2023
3003	A	01/17/2023
4004	A	03/24/2023
5005	A	04/01/2023
6006	B	06/22/2023
7007	B	06/23/2023
8008	B	09/01/2023

Here is the expected output.

Customer ID	Repair ID	Previous Repair ID	Repair Date	Previous Repair Date	Sequence Number	Repair Gap Days
A	2002	1001	01/15/2023	01/01/2023	1	14
A	3003	2002	01/17/2023	01/15/2023	2	2
A	5005	4004	04/01/2023	03/24/2023	1	8
B	7007	6006	06/23/2023	06/22/2023	1	1

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Part II

Permutations, Combinations, Sequences and Random Numbers

Building Complex Numbers Table

Puzzle #1

Factorials

Create a numbers table of 1 through 10 and their factorial.

Here is the expected output.

Number	Factorial
1	1
2	2
3	6
4	24
5	120
6	720
7	5,040
8	40,320
9	362,880
10	3,628,800

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #2

All Permutations

Create a numbers table of all permutations of *n* distinct numbers.

Here is the expected output for the set {1, 2, 3}.

Max Number	Permutation
3	1,2,3
3	1,3,2
3	2,1,3
3	2,3,1
3	3,1,2
3	3,2,1

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #3

Growing Numbers

Create a numbers table that shows all numbers 1 through *n* and their order gradually increasing by the next number in the sequence.

Here is the expected output where *n* = 5.

Permutation
1
12
123
1234
12345

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #4

Non-Adjacent Numbers

Given an ordered set of numbers (for example {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}); create a result set of permutations where no two adjacent entries are adjacent numbers.

For example…

The arrangement {1, 3, 5, 7, 9, 2, 4, 6, 8, 10} **would** fit the criteria as no two entries are adjacent numbers.

The arrangement {**1**, **2**, 4, 6, 8, 10, 3, 5, 7, 9} would **not** fit the criteria as 1 and 2 are adjacent numbers.

The arrangement {1, 4, 2, 6, 7, 10, 3, 5, **8**, **9**} would **not** fit the criteria as 6 and 7 are adjacent numbers.

The arrangement {1, **3**, **2**, 6, 7, 10, 9, 5, 8, 4} would **not** fit the criteria as 3 and 2 are adjacent numbers.

Here is the expected output for the set of {1, 2, 3, 4}.

Permutation
2,4,1,3
3,1,4,2

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #5

Add the Numbers Up

Given an ordered set of numbers 1 through n (for example 1, 2, 3, 4, 5, 6, 7, 8, 9, 10), and a + or – sign at all possible groupings; create all possible permutations and the amount in which they add up to.

Here is the expected output for the set of {1, 2, 3}.

Permutation	Sum
123	123
1+2+3	6
1+2-3	0
1+23	24
1-2+3	2
1-2-3	-4
1-23	-22
12+3	15
12-3	9

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #6

Permutations of 0 and 1

Create a result set of all permutations for the combination of 0 and 1 with a length of *n* digits.

Here is the expected output for permutations with a length of 3 digits.

Permutation
000
001
010
011
100
101
110
111

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #7

Permutations 1 through 10

Display all permutations for the numbers 1 through *n*, displaying only the first *n* numbers.

Here is the expected output for all 24 permutations for the set {1,2,3,4}, displaying only the first three numbers.

Permutation
1,2,3
1,2,4
1,3,2
1,3,4
1,4,2
1,4,3
2,1,3
2,1,4
2,3,1
2,3,4
2,4,1
2,4,3
3,1,2
3,1,4
3,2,1
3,2,4
3,4,1
3,4,2
4,1,2
4,1,3
4,2,1
4,2,3
4,3,1
4,3,2

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #8

Four Vehicles Problem

Here is an example problem involving combinations.

Given the following four vehicles:

- 1-seat motorcycle
- 2-seat sidecar
- 3-seat golf cart
- 4-seat car

There are 10 people in total; 5 are children, and 5 are adults. Only an adult can drive a vehicle.

Create a table of all possible 7,200 arrangements, assuming seating order does not matter.

We can determine there are 7,200 arrangements by using the following equation.

$$\text{Total Arrangements} = \frac{5!}{1!} * \frac{6!}{3!*2!*1!*0!} = 7{,}200$$

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #9

Find the Spaces

Given the following table of SQL statements, provide a numbers table that displays a summary of the space character for each SQL statement.

Statement
SELECT EmpID FROM Emps;
SELECT * FROM Trans;

Here is the expected output.

RowNumber	Id	String	Starts	Position	Word	TotalSpaces
1	1	SELECT EmpID FROM Emps;	1	7	SELECT	3
2	1	SELECT EmpID FROM Emps;	8	13	EmpID	3
3	1	SELECT EmpID FROM Emps;	14	18	FROM	3
4	1	SELECT EmpID FROM Emps;	19	0	Emps;	3
1	2	SELECT * FROM Trans;	1	7	SELECT	3
2	2	SELECT * FROM Trans;	8	9	*	3
3	2	SELECT * FROM Trans;	10	14	FROM	3
4	2	SELECT * FROM Trans;	15	0	Trans;	3

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

PuzzleSeat #10

Seating Chart

Given the set of integers provided in the following DDL statement, write the SQL statements to determine the following:

- Gap start and gap ends
- Total missing numbers
- Count of odd and even numbers

```
CREATE TABLE #SeatingChart
(
SeatNumber INTEGER
);
GO

INSERT INTO #SeatingChart VALUES
(7),(13),(14),(15),(27),(28),(29),(30),
(31),(32),(33),(34),(35),(52),(53),(54);
GO
```

Here is the expected output.

Gap Start	Gap End
1	6
8	12
16	26
36	51

Total Missing Numbers
38

Type	Count
Even Numbers	8
Odd Numbers	9

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #11

Count the Groupings

Write an SQL statement that counts the consecutive values in the Status column.

Step Number	Status
1	Passed
2	Passed
3	Passed
4	Passed
5	Failed
6	Failed
7	Failed
8	Failed
9	Failed
10	Passed
11	Passed
12	Passed

Here is the expected outcome.

Min Step Number	Max Step Number	Status	Consecutive Count
1	4	Passed	4
5	9	Failed	5
10	12	Passed	3

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #12

Double or Add 1

Create a numbers table where you start with the number 1, and then double the number if the result is less than 100, else add 1.

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #13

Pascal's Triangle

Solve for any position in Pascal's Triangle.

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #14

Josephus Problem

Solve the Josephus Problem.

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #15

High-Low Card Game

Write a program that shuffles a standard deck of cards and plays a game of High-Low.

The game is played by receiving an initial card and then determining if the next card will be of higher or lower value based on probability. Make a random decision of higher or lower where necessary.

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #16

Monty Hall Simulation

Run 10,000 simulations of the Monty Hall problem to prove it is true.

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #17

Dice Throw Game

What is the average number of dice throws needed to reach 100 points given the following rules?

- Starting at 0, for each dice throw resulting in 1 through 5, add the dice amount to your score.
- If you roll a 6 (even on a re-roll), re-roll the dice and reduce your score by this amount. You cannot go lower than 0 points.

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #18

The Birthday Problem

Run 10,000 simulations of the Birthday problem to prove it is true.

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #19

Random Walk

Perform a random walk best described by the following puzzle:

As the host of a weekly dinner gathering that includes you and seven friends, you've come up with an interesting method to decide who will be the host for the upcoming dinner party.

After the meal, all attendees, including yourself, gather around a circular table. You, as the current host, initiate a game by flipping a fair coin. If the coin lands heads up, you hand the coin to the person sitting on your right; if it is tails, you pass it to your left.

The person who gets the coin then repeats the process, flipping it and passing it to their right or left based on the result. This cycle continues until there is only one person left who has not yet received the coin.

This last remaining individual, who has not touched the coin, is announced as the winner and is given the responsibility of hosting the next dinner party.

Note that because you were the first to flip the coin in the game, you are immediately disqualified from the possibility of hosting the upcoming dinner party.

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #20

Markov Chain

Perform a Markov Chain best described by the following puzzle:

In Probability Land, on a sunny day, there is an equal probability of the next day being sunny or rainy. On a rainy day there is a 70% chance it will rain the next day, and a 30% chance it will be sunny the next day.

On average, how many rainy days are there in Probability Land?

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #21

100 Prisoners Riddle

Run 10,000 simulations of the 100 Prisonsers Problem to prove it is true.

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

Puzzle #22

Non-Overlapping Sets

You are given a table of orders, their line items, and the cost associated with each line item. Your task is to write an SQL statement that finds the maximum number of non-overlapping sets of line items for each order, with the condition that the total cost of line items in each set must be greater than or equal to $10. A set can be no greater than 2 records.

Order ID	Line Item	Cost
1	1	$9
1	2	$15
1	3	$7
1	4	$3
1	5	$1
1	6	$1
2	1	$10
2	2	$10
2	3	$11
3	1	$3
3	2	$4

Here is the expected outcome.

Order ID	Set Count	Set Combinations
1	3	(1,5),(2),(3,4)
1	3	(1,6),(2),(3,4)
2	3	(1),(2),(3)
3	0	
4	1	(1,2)
5	1	(1,2)
5	1	(1,3)
5	1	(2,3)

- Order ID 1 has 2 possible combinations of line items that total over $10, each with 3 sets.
- Order ID 2 has 1 possible combination of line items that total over $10, which has 3 sets.
- Order ID 3 has 0 possible combinations of line items that total over $10.
- Order ID 4 has 1 possible combination of line items that total over $10, which has 1 set.
- Order ID 5 has 3 possible combinations of line items that total over $10, each with 2 sets.

Answers to the puzzles are located in the following GitHub repository.
AdvancedSQLPuzzles/Advanced SQL Puzzles

THE END