```
-- ##########################################################################
 -- Question 21
-- Table: ActorDirector
-- +-------------+---------+
-- | Column Name | Type    |
-- +-------------+---------+
-- | actor_id    | int     |
-- | director_id | int     |
-- | timestamp   | int     |
-- +-------------+---------+
-- timestamp is the primary key column for this table.

-- Write a SQL query for a report that provides the pairs (actor_id, director_id) where the actor have cooperated with the director at least 3 times.

-- Example:
-- ActorDirector table:
-- +-------------+-------------+-------------+
-- | actor_id    | director_id | timestamp   |
-- +-------------+-------------+-------------+
-- | 1           | 1           | 0           |
-- | 1           | 1           | 1           |
-- | 1           | 1           | 2           |
-- | 1           | 2           | 3           |
-- | 1           | 2           | 4           |
-- | 2           | 1           | 5           |
-- | 2           | 1           | 6           |
-- +-------------+-------------+-------------+

-- Result table:
-- +-------------+-------------+
-- | actor_id    | director_id |
-- +-------------+-------------+
-- | 1           | 1           |
-- +-------------+-------------+
-- The only pair is (1, 1) where they cooperated exactly 3 times.

-- ======= Solution
================================================================================

Select actor_id, director_id
from actordirector
group by actor_id, director_id
having count(*)>=3

-- ##########################################################################
-- ##########################################################################
 -- Question 13
-- Table: Ads
-- +---------------+---------+
-- | Column Name   | Type    |
```

```
-- +---------------+---------+
-- | ad_id         | int     |
-- | user_id       | int     |
-- | action        | enum    |
-- +---------------+---------+
-- (ad_id, user_id) is the primary key for this table.
-- Each row of this table contains the ID of an Ad, the ID of a user and the action taken by this user regarding this Ad.
-- The action column is an ENUM type of ('Clicked', 'Viewed', 'Ignored').

-- A company is running Ads and wants to calculate the performance of each Ad.
-- Performance of the Ad is measured using Click-Through Rate (CTR) where:

-- Write an SQL query to find the ctr of each Ad.
-- Round ctr to 2 decimal points. Order the result table by ctr in descending order and by ad_id in ascending order in case of a tie.
-- The query result format is in the following example:

-- Ads table:
-- +-------+---------+---------+
-- | ad_id | user_id | action  |
-- +-------+---------+---------+
-- | 1     | 1       | Clicked |
-- | 2     | 2       | Clicked |
-- | 3     | 3       | Viewed  |
-- | 5     | 5       | Ignored |
-- | 1     | 7       | Ignored |
-- | 2     | 7       | Viewed  |
-- | 3     | 5       | Clicked |
-- | 1     | 4       | Viewed  |
-- | 2     | 11      | Viewed  |
-- | 1     | 2       | Clicked |
-- +-------+---------+---------+
-- Result table:
-- +-------+-------+
-- | ad_id | ctr   |
-- +-------+-------+
-- | 1     | 66.67 |
-- | 3     | 50.00 |
-- | 2     | 33.33 |
-- | 5     | 0.00  |
-- +-------+-------+
-- for ad_id = 1, ctr = (2/(2+1)) * 100 = 66.67
-- for ad_id = 2, ctr = (1/(1+2)) * 100 = 33.33
-- for ad_id = 3, ctr = (1/(1+1)) * 100 = 50.00
-- for ad_id = 5, ctr = 0.00, Note that ad_id = 5 has no clicks or views.
-- Note that we don't care about Ignored Ads.
-- Result table is ordered by the ctr. in case of a tie we order them by ad_id

-- ======= Solution
================================================================================
```

```
with t1 as(
select ad_id, sum(case when action in ('Clicked') then 1 else 0 end) as clicked
from ads
group by ad_id
)

, t2 as
(
Select ad_id as ad, sum(case when action in ('Clicked','Viewed') then 1 else 0 end) as total
from ads
group by ad_id
)

Select a.ad_id, coalesce(round((clicked +0.0)/nullif((total +0.0),0)*100,2),0) as ctr
from
(
select *
from t1 join t2
on t1.ad_id = t2.ad) a
order by ctr desc, ad_id

-- ##########################################################################
 -- ##########################################################################
 -- Question 42
-- Table: Views
-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | article_id    | int     |
-- | author_id     | int     |
-- | viewer_id     | int     |
-- | view_date     | date    |
-- +---------------+---------+
-- There is no primary key for this table, it may have duplicate rows.
-- Each row of this table indicates that some viewer viewed an article (written by some author) on some date.
-- Note that equal author_id and viewer_id indicate the same person.

-- Write an SQL query to find all the authors that viewed at least one of their own articles, sorted in ascending order by their id.
-- The query result format is in the following example:

-- Views table:
-- +------------+-----------+-----------+------------+
-- | article_id | author_id | viewer_id | view_date  |
-- +------------+-----------+-----------+------------+
-- | 1          | 3         | 5         | 2019-08-01 |
-- | 1          | 3         | 6         | 2019-08-02 |
-- | 2          | 7         | 7         | 2019-08-01 |
-- | 2          | 7         | 6         | 2019-08-02 |
-- | 4          | 7         | 1         | 2019-07-22 |
-- | 3          | 4         | 4         | 2019-07-21 |
```

```
-- | 3         | 4         | 4         | 2019-07-21 |
-- +-----------+-----------+-----------+------------+

-- Result table:
-- +------+
-- | id   |
-- +------+
-- | 4    |
-- | 7    |
-- +------+

-- ======= Solution
================================================================================

select distinct author_id as id
from views
where author_id = viewer_id
order by author_id

-- ##########################################################################
 -- ##########################################################################
 -- Question 39
-- Table: Prices
-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | product_id    | int     |
-- | start_date    | date    |
-- | end_date      | date    |
-- | price         | int     |
-- +---------------+---------+
-- (product_id, start_date, end_date) is the primary key for this table.
-- Each row of this table indicates the price of the product_id in the period from start_date to end_date.
-- For each product_id there will be no two overlapping periods. That means there will be no two intersecting periods for the same product_id.

-- Table: UnitsSold
-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | product_id    | int     |
-- | purchase_date | date    |
-- | units         | int     |
-- +---------------+---------+
-- There is no primary key for this table, it may contain duplicates.
-- Each row of this table indicates the date, units and product_id of each product sold.



-- Write an SQL query to find the average selling price for each product.
-- average_price should be rounded to 2 decimal places.
-- The query result format is in the following example:
```

```
-- Prices table:
-- +------------+------------+------------+--------+
-- | product_id | start_date | end_date   | price  |
-- +------------+------------+------------+--------+
-- | 1          | 2019-02-17 | 2019-02-28 | 5      |
-- | 1          | 2019-03-01 | 2019-03-22 | 20     |
-- | 2          | 2019-02-01 | 2019-02-20 | 15     |
-- | 2          | 2019-02-21 | 2019-03-31 | 30     |
-- +------------+------------+------------+--------+

-- UnitsSold table:
-- +------------+---------------+-------+
-- | product_id | purchase_date | units |
-- +------------+---------------+-------+
-- | 1          | 2019-02-25    | 100   |
-- | 1          | 2019-03-01    | 15    |
-- | 2          | 2019-02-10    | 200   |
-- | 2          | 2019-03-22    | 30    |
-- +------------+---------------+-------+

-- Result table:
-- +------------+---------------+
-- | product_id | average_price |
-- +------------+---------------+
-- | 1          | 6.96          |
-- | 2          | 16.96         |
-- +------------+---------------+
-- Average selling price = Total Price of Product / Number of products sold.
-- Average selling price for product 1 = ((100 * 5) + (15 * 20)) / 115 = 6.96
-- Average selling price for product 2 = ((200 * 15) + (30 * 30)) / 230 = 16.96

-- ======= Solution
================================================================================

Select d.product_id, round((sum(price*units)+0.00)/(sum(units)+0.00),2) as average_price
from(
Select *
from prices p
natural join
unitssold u
where u.purchase_date between p.start_date and p.end_date) d
group by d.product_id


-- ########################################################################
 -- ########################################################################
 -- Question 5
-- There is a table World
-- +----------------+------------+------------+--------------+---------------+
-- | name           | continent  | area       | population   | gdp           |
```

```
-- +-----------------+------------+------------+--------------+---------------+
-- | Afghanistan     | Asia       | 652230     | 25500100     | 20343000      |
-- | Albania         | Europe     | 28748      | 2831741      | 12960000      |
-- | Algeria         | Africa     | 2381741    | 37100000     | 188681000     |
-- | Andorra         | Europe     | 468        | 78115        | 3712000       |
-- | Angola          | Africa     | 1246700    | 20609294     | 100990000     |
-- +-----------------+------------+------------+--------------+---------------+
-- A country is big if it has an area of bigger than 3 million square km or a population of more than 25 million.

-- Write a SQL solution to output big countries' name, population and area.
-- For example, according to the above table, we should output:
-- +--------------+-------------+--------------+
-- | name         | population  | area         |
-- +--------------+-------------+--------------+
-- | Afghanistan  | 25500100    | 652230       |
-- | Algeria      | 37100000    | 2381741      |
-- +--------------+-------------+--------------+

-- ======= Solution
================================================================================

Select name, population, area
from world
where population > 25000000 OR area>3000000


-- ###########################################################################
 -- ###########################################################################
 -- Question 24
-- Table my_numbers contains many numbers in column num including duplicated ones.
-- Can you write a SQL query to find the biggest number, which only appears once.
-- +---+
-- |num|
-- +---+
-- | 8 |
-- | 8 |
-- | 3 |
-- | 3 |
-- | 1 |
-- | 4 |
-- | 5 |
-- | 6 |
-- For the sample data above, your query should return the following result:
-- +---+
-- |num|
-- +---+
-- | 6 |
-- Note:
-- If there is no such number, just output null.
```

```
-- ======= Solution
================================================================================

Select max(a.num) as num
from
(
   select num, count(*)
   from my_numbers
   group by num
   having count(*)=1
) a

-- ###########################################################################
 -- ###########################################################################
 -- Question7
-- There is a table courses with columns: student and class

-- Please list out all classes which have more than or equal to 5 students.
-- For example, the table:
-- +---------+------------+
-- | student | class      |
-- +---------+------------+
-- | A       | Math       |
-- | B       | English    |
-- | C       | Math       |
-- | D       | Biology    |
-- | E       | Math       |
-- | F       | Computer   |
-- | G       | Math       |
-- | H       | Math       |
-- | I       | Math       |
-- +---------+------------+

-- ======= Solution
================================================================================

select class
from courses
group by class
having count(distinct student)>=5

-- ###########################################################################
 -- ###########################################################################
 -- Question 14
-- Table: Person
-- +-------------+---------+
-- | Column Name | Type    |
-- +-------------+---------+
-- | PersonId    | int     |
-- | FirstName   | varchar |
-- | LastName    | varchar |
```

```
-- +-------------+---------+
-- PersonId is the primary key column for this table.
-- Table: Address
-- +-------------+---------+
-- | Column Name | Type    |
-- +-------------+---------+
-- | AddressId   | int     |
-- | PersonId    | int     |
-- | City        | varchar |
-- | State       | varchar |
-- +-------------+---------+
-- AddressId is the primary key column for this table.


-- Write a SQL query for a report that provides the following information for each person in the Person table,
-- regardless if there is an address for each of those people:

-- FirstName, LastName, City, State

-- ======= Solution
================================================================================

select FirstName, LastName, City, State
from Person P left join Address A
on P.PersonId = A.PersonId

-- ##########################################################################
 -- ##########################################################################
 -- Question 37
-- Several friends at a cinema ticket office would like to reserve consecutive available seats.
-- Can you help to query all the consecutive available seats order by the seat_id using the following cinema table?
-- | seat_id | free |
-- |---------|------|
-- | 1       | 1    |
-- | 2       | 0    |
-- | 3       | 1    |
-- | 4       | 1    |
-- | 5       | 1    |

-- Your query should return the following result for the sample case above.

-- | seat_id |
-- |---------|
-- | 3       |
-- | 4       |
-- | 5       |
-- Note:
-- The seat_id is an auto increment int, and free is bool ('1' means free, and '0' means occupied.).
-- Consecutive available seats are more than 2(inclusive) seats consecutively available.
```

-- ======= Solution
==========

```
Select seat_id
from(
select seat_id, free,
lead(free,1) over() as next,
lag(free,1) over() as prev
from cinema) a
where a.free=True and (next = True or prev=True)
order by seat_id
```

-- ##########################################################################
-- ##########################################################################
-- Question 2
-- Table: Sessions
-- +---------------------+---------+
-- | Column Name | Type |
-- +---------------------+---------+
-- | session_id | int |
-- | duration | int |
-- +---------------------+---------+
-- session_id is the primary key for this table.
-- duration is the time in seconds that a user has visited the application.
-- You want to know how long a user visits your application. You decided to create bins of "[0-5>", "[5-10>", "[10-15>" and "15 minutes or more" and count the number of sessions on it.

-- Write an SQL query to report the (bin, total) in any order.
-- The query result format is in the following example.

-- Sessions table:
-- +-------------+---------------+
-- | session_id | duration |
-- +-------------+---------------+
-- | 1 | 30 |
-- | 2 | 199 |
-- | 3 | 299 |
-- | 4 | 580 |
-- | 5 | 1000 |
-- +-------------+---------------+

-- Result table:
-- +--------------+--------------+
-- | bin | total |
-- +--------------+--------------+
-- | [0-5> | 3 |
-- | [5-10> | 1 |
-- | [10-15> | 0 |
-- | 15 or more | 1 |
-- +--------------+--------------+

```
-- For session_id 1, 2 and 3 have a duration greater or equal than 0 minutes and less than 5 minutes.
-- For session_id 4 has a duration greater or equal than 5 minutes and less than 10 minutes.
-- There are no session with a duration greater or equial than 10 minutes and less than 15 minutes.
-- For session_id 5 has a duration greater or equal than 15 minutes.

-- ======= Solution
================================================================================
 2
(Select '[0-5>' as bin,
 sum(case when duration/60 < 5 then 1 else 0 end) as total from Sessions)
 union
(Select '[5-10>' as bin,
 sum(case when ((duration/60 >= 5) and (duration/60 < 10)) then 1 else 0 end) as total from Sessions)
 union
(Select '[10-15>' as bin,
 sum(case when ((duration/60 >= 10) and (duration/60 < 15)) then 1 else 0 end) as total from Sessions)
 union
(Select '15 or more' as bin,
 sum(case when duration/60 >= 15 then 1 else 0 end) as total from Sessions)

-- ##########################################################################
 -- ##########################################################################
 -- Question 8
-- Query the customer_number from the orders table for the customer who has placed the largest number of orders.

-- It is guaranteed that exactly one customer will have placed more orders than any other customer.
-- The orders table is defined as follows:
-- | Column           | Type      |
-- |------------------|-----------|
-- | order_number (PK) | int       |
-- | customer_number   | int       |
-- | order_date        | date      |
-- | required_date     | date      |
-- | shipped_date      | date      |
-- | status            | char(15)  |
-- | comment           | char(200) |

-- Sample Input
-- | order_number | customer_number | order_date | required_date | shipped_date | status | comment |
-- |--------------|-----------------|------------|---------------|--------------|--------|---------|
-- | 1            | 1               | 2017-04-09 | 2017-04-13    | 2017-04-12   | Closed |         |
-- | 2            | 2               | 2017-04-15 | 2017-04-20    | 2017-04-18   | Closed |         |
-- | 3            | 3               | 2017-04-16 | 2017-04-25    | 2017-04-20   | Closed |         |
-- | 4            | 3               | 2017-04-18 | 2017-04-28    | 2017-04-25   | Closed |         |

-- Sample Output
-- | customer_number |
-- |-----------------|
-- | 3               |
-- Explanation
```

```
-- The customer with number '3' has two orders,
-- which is greater than either customer '1' or '2' because each of them  only has one order.
-- So the result is customer_number '3'.

-- ======= Solution
================================================================================

-- Ranking them according to the number of orders to have same rank for
-- customers with same number of orders
With t1 as
(
 Select customer_number,
 Rank() over(order by count(customer_number) desc) as rk
 from orders
 group by customer_number
)

Select t1.customer_number
from t1
where t1.rk=1

-- ##########################################################################
 -- ##########################################################################
 -- Question 13
-- Suppose that a website contains two tables,
-- the Customers table and the Orders table. Write a SQL query to find all customers who never order anything.

-- Table: Customers.
-- +----+-------+
-- | Id | Name  |
-- +----+-------+
-- | 1  | Joe   |
-- | 2  | Henry |
-- | 3  | Sam   |
-- | 4  | Max   |
-- +----+-------+
-- Table: Orders.
-- +----+------------+
-- | Id | CustomerId |
-- +----+------------+
-- | 1  | 3          |
-- | 2  | 1          |
-- +----+------------+
-- Using the above tables as example, return the following:
-- +-----------+
-- | Customers |
-- +-----------+
-- | Henry     |
-- | Max       |
-- +-----------+
```

-- ======= Solution
==========

```
Select Name as Customers
from Customers
where id != All(select c.id
            from Customers c, Orders o
            where c.id = o.Customerid)
```

-- ##########
 -- ##########
 -- Question 32
-- Write a SQL query to delete all duplicate email entries in a table named Person, keeping only unique emails based on its smallest Id.
-- +----+------------------+
-- | Id | Email            |
-- +----+------------------+
-- | 1  | john@example.com |
-- | 2  | bob@example.com  |
-- | 3  | john@example.com |
-- +----+------------------+
-- Id is the primary key column for this table.
-- For example, after running your query, the above Person table should have the following rows:
-- +----+------------------+
-- | Id | Email            |
-- +----+------------------+
-- | 1  | john@example.com |
-- | 2  | bob@example.com  |
-- +----+------------------+

-- ======= Solution
==========

```
With t1 as
(
 Select *,
   row_number() over(partition by email order by id) as rk
   from person
)
Delete from person
where id in (Select t1.id from t1 where t1.rk>1)
```

-- ##########
 -- ##########
 -- Question 11
-- Write a SQL query to find all duplicate emails in a table named Person.
-- +----+---------+
-- | Id | Email   |
-- +----+---------+
-- | 1  | a@b.com |
-- | 2  | c@d.com |

```
-- | 3  | a@b.com |
-- +----+---------+
-- For example, your query should return the following for the above table:
-- +---------+
-- | Email   |
-- +---------+
-- | a@b.com |
-- +---------+

-- ======= Solution
================================================================================

Select Email
from
(Select Email, count(Email)
from person
group by Email
having count(Email)>1) a

-- ##########################################################################
 -- ##########################################################################
 -- Question 4
-- Select all employee's name and bonus whose bonus is < 1000.
-- Table:Employee
-- +-------+--------+-----------+--------+
-- | empId |  name  | supervisor| salary |
-- +-------+--------+-----------+--------+
-- |   1   | John   |  3        | 1000   |
-- |   2   | Dan    |  3        | 2000   |
-- |   3   | Brad   |  null     | 4000   |
-- |   4   | Thomas |  3        | 4000   |
-- +-------+--------+-----------+--------+
-- empId is the primary key column for this table.
-- Table: Bonus
-- +-------+-------+
-- | empId | bonus |
-- +-------+-------+
-- | 2     | 500   |
-- | 4     | 2000  |
-- +-------+-------+
-- empId is the primary key column for this table.
-- Example ouput:
-- +-------+-------+
-- | name  | bonus |
-- +-------+-------+
-- | John  | null  |
-- | Dan   | 500   |
-- | Brad  | null  |
-- +-------+-------+
```

-- ======= Solution
==========

Select E.name, B.bonus
From Employee E left join Bonus B
on E.empId = B.empId
where B.bonus< 1000 or B.Bonus IS NULL

-- ##########################################################################
-- ##########################################################################
-- Question 15
-- The Employee table holds all employees including their managers.
-- Every employee has an Id, and there is also a column for the manager Id.
-- +----+-------+--------+-----------+
-- | Id | Name  | Salary | ManagerId |
-- +----+-------+--------+-----------+
-- | 1  | Joe   | 70000  | 3         |
-- | 2  | Henry | 80000  | 4         |
-- | 3  | Sam   | 60000  | NULL      |
-- | 4  | Max   | 90000  | NULL      |
-- +----+-------+--------+-----------+
-- Given the Employee table, write a SQL query that finds out employees who earn more than their managers.
-- For the above table, Joe is the only employee who earns more than his manager.
-- +----------+
-- | Employee |
-- +----------+
-- | Joe      |
-- +----------+

-- ======= Solution
==========

select a.Name as Employee
from employee a, employee b
where a.salary>b.salary and a.managerid=b.id

-- ##########################################################################
-- ##########################################################################
-- Question 10
-- Given a table customer holding customers information and the referee.
-- +------+------+-----------+
-- | id   | name | referee_id|
-- +------+------+-----------+
-- |    1 | Will |      NULL |
-- |    2 | Jane |      NULL |
-- |    3 | Alex |         2 |
-- |    4 | Bill |      NULL |
-- |    5 | Zack |         1 |
-- |    6 | Mark |         2 |
-- +------+------+-----------+
-- Write a query to return the list of customers NOT referred by the person with id '2'.

-- For the sample data above, the result is:

-- +------+
-- | name |
-- +------+
-- | Will |
-- | Jane |
-- | Bill |
-- | Zack |
-- +------+

-- ======= Solution
==========

Select name
from customer
where referee_id != 2
or referee_id is NULL

-- ##########################################################################
 -- ##########################################################################
 -- Question 47
-- Table: Employee
-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | employee_id   | int     |
-- | team_id       | int     |
-- +---------------+---------+
-- employee_id is the primary key for this table.
-- Each row of this table contains the ID of each employee and their respective team.
-- Write an SQL query to find the team size of each of the employees.

-- Return result table in any order.
-- The query result format is in the following example:
-- Employee Table:
-- +-------------+------------+
-- | employee_id | team_id    |
-- +-------------+------------+
-- |     1       |     8      |
-- |     2       |     8      |
-- |     3       |     8      |
-- |     4       |     7      |
-- |     5       |     9      |
-- |     6       |     9      |
-- +-------------+------------+
-- Result table:
-- +-------------+------------+
-- | employee_id | team_size  |
-- +-------------+------------+
-- |     1       |     3      |

```
-- |    2      |    3     |
-- |    3      |    3     |
-- |    4      |    1     |
-- |    5      |    2     |
-- |    6      |    2     |
-- +-------------+------------+
-- Employees with Id 1,2,3 are part of a team with team_id = 8.
-- Employees with Id 4 is part of a team with team_id = 7.
-- Employees with Id 5,6 are part of a team with team_id = 9.

-- ======= Solution
================================================================================

Select employee_id, b.team_size
from employee e
join
(
Select team_id, count(team_id) as team_size
from employee
group by team_id) b
on e.team_id = b.team_id

-- ##########################################################################
 -- ##########################################################################
 -- Question 49
-- In social network like Facebook or Twitter, people send friend requests and accept others' requests as well. Now given two tables as below:
-- Table: friend_request
-- | sender_id | send_to_id |request_date|
-- |-----------|------------|------------|
-- | 1         | 2          | 2016_06-01 |
-- | 1         | 3          | 2016_06-01 |
-- | 1         | 4          | 2016_06-01 |
-- | 2         | 3          | 2016_06-02 |
-- | 3         | 4          | 2016-06-09 |

-- Table: request_accepted
-- | requester_id | accepter_id |accept_date |
-- |--------------|-------------|------------|
-- | 1            | 2           | 2016_06-03 |
-- | 1            | 3           | 2016-06-08 |
-- | 2            | 3           | 2016-06-08 |
-- | 3            | 4           | 2016-06-09 |
-- | 3            | 4           | 2016-06-10 |

-- Write a query to find the overall acceptance rate of requests rounded to 2 decimals, which is the number of acceptance divide the number of requests.

-- For the sample data above, your query should return the following result.
-- |accept_rate|
-- |-----------|
```

```
-- |      0.80|

-- Note:
-- The accepted requests are not necessarily from the table friend_request. In this case, you just need to simply count the total accepted requests (no matter whether they are in the original requests), and divide it by the number of requests to get the acceptance rate.
-- It is possible that a sender sends multiple requests to the same receiver, and a request could be accepted more than once. In this case, the 'duplicated' requests or acceptances are only counted once.
-- If there is no requests at all, you should return 0.00 as the accept_rate.

-- Explanation: There are 4 unique accepted requests, and there are 5 requests in total.
-- So the rate is 0.80.

-- ======= Solution
================================================================================

with t1 as
(
        select distinct sender_id, send_to_id
        from friend_request
), t2 as
(
        select distinct requester_id, accepter_id
        from request_accepted
)

Select
ifnull((
      select distinct
      round((select count(*) from t2) / ( select count(*) from t1),2) from t1,t2
   ),0) 'accept_rate'

-- ######################################################################
 -- ######################################################################
 -- Question 115
-- Write an SQL query to report the distinct titles of the kid-friendly movies streamed in June 2020.

-- Return the result table in any order.
-- The query result format is in the following example.
-- TVProgram table:
-- +--------------------+--------------+-------------+
-- | program_date       | content_id   | channel     |
-- +--------------------+--------------+-------------+
-- | 2020-06-10 08:00   | 1            | LC-Channel  |
-- | 2020-05-11 12:00   | 2            | LC-Channel  |
-- | 2020-05-12 12:00   | 3            | LC-Channel  |
-- | 2020-05-13 14:00   | 4            | Disney Ch   |
-- | 2020-06-18 14:00   | 4            | Disney Ch   |
-- | 2020-07-15 16:00   | 5            | Disney Ch   |
-- +--------------------+--------------+-------------+
```

```
-- Content table:
-- +------------+----------------+---------------+---------------+
-- | content_id | title          | Kids_content  | content_type  |
-- +------------+----------------+---------------+---------------+
-- | 1          | Leetcode Movie | N             | Movies        |
-- | 2          | Alg. for Kids  | Y             | Series        |
-- | 3          | Database Sols  | N             | Series        |
-- | 4          | Aladdin        | Y             | Movies        |
-- | 5          | Cinderella     | Y             | Movies        |
-- +------------+----------------+---------------+---------------+

-- Result table:
-- +--------------+
-- | title        |
-- +--------------+
-- | Aladdin      |
-- +--------------+
-- "Leetcode Movie" is not a content for kids.
-- "Alg. for Kids" is not a movie.
-- "Database Sols" is not a movie
-- "Alladin" is a movie, content for kids and was streamed in June 2020.
-- "Cinderella" was not streamed in June 2020.

-- ======= Solution
================================================================================

select distinct title
from
(select content_id, title
from content
where kids_content = 'Y' and content_type = 'Movies') a
join
tvprogram using (content_id)
where month(program_date) = 6

-- ##########################################################################
 -- ##########################################################################
 -- Question 3
-- Table: Activity
-- +--------------+---------+
-- | Column Name  | Type    |
-- +--------------+---------+
-- | player_id    | int     |
-- | device_id    | int     |
-- | event_date   | date    |
-- | games_played | int     |
-- +--------------+---------+
-- (player_id, event_date) is the primary key of this table.
-- This table shows the activity of players of some game.
-- Each row is a record of a player who logged in and played a number of games (possibly 0) before logging out on some day using some device.
```

-- Write an SQL query that reports the first login date for each player.

-- The query result format is in the following example:
-- Activity table:
-- +-----------+-----------+------------+--------------+
-- | player_id | device_id | event_date | games_played |
-- +-----------+-----------+------------+--------------+
-- | 1         | 2         | 2016-03-01 | 5            |
-- | 1         | 2         | 2016-05-02 | 6            |
-- | 2         | 3         | 2017-06-25 | 1            |
-- | 3         | 1         | 2016-03-02 | 0            |
-- | 3         | 4         | 2018-07-03 | 5            |
-- +-----------+-----------+------------+--------------+

-- Result table:
-- +-----------+-------------+
-- | player_id | first_login |
-- +-----------+-------------+
-- | 1         | 2016-03-01  |
-- | 2         | 2017-06-25  |
-- | 3         | 2016-03-02  |
-- +-----------+-------------+

-- ======= Solution
==========

Select player_id, min(event_date) as first_login
from Activity
Group by player_id
-- ##########################################################################

-- ##########################################################################
-- Question 9
-- Table: Activity
-- +--------------+---------+
-- | Column Name  | Type    |
-- +--------------+---------+
-- | player_id    | int     |
-- | device_id    | int     |
-- | event_date   | date    |
-- | games_played | int     |
-- +--------------+---------+
-- (player_id, event_date) is the primary key of this table.
-- This table shows the activity of players of some game.
-- Each row is a record of a player who logged in and played a number of games (possibly 0) before logging out on some day using some device.

-- Write a SQL query that reports the device that is first logged in for each player.

-- The query result format is in the following example:

```
-- Activity table:
-- +-----------+-----------+------------+--------------+
-- | player_id | device_id | event_date | games_played |
-- +-----------+-----------+------------+--------------+
-- | 1         | 2         | 2016-03-01 | 5            |
-- | 1         | 2         | 2016-05-02 | 6            |
-- | 2         | 3         | 2017-06-25 | 1            |
-- | 3         | 1         | 2016-03-02 | 0            |
-- | 3         | 4         | 2018-07-03 | 5            |
-- +-----------+-----------+------------+--------------+

-- Result table:
-- +-----------+-----------+
-- | player_id | device_id |
-- +-----------+-----------+
-- | 1         | 2         |
-- | 2         | 3         |
-- | 3         | 1         |
-- +-----------+-----------+

-- ======= Solution
================================================================================

With table1 as
(
  Select player_id, device_id,
  Rank() OVER(partition by player_id
          order by event_date) as rk
  From Activity
)
Select t.player_id, t.device_id
from table1 as t
where t.rk=1

-- ########################################################################
 -- ########################################################################
 -- Question 116
-- Table Activities:
-- +-------------+---------+
-- | Column Name | Type    |
-- +-------------+---------+
-- | sell_date   | date    |
-- | product     | varchar |
-- +-------------+---------+
-- There is no primary key for this table, it may contains duplicates.
-- Each row of this table contains the product name and the date it was sold in a market.

-- Write an SQL query to find for each date, the number of distinct products sold and their names.

-- The sold-products names for each date should be sorted lexicographically.
-- Return the result table ordered by sell_date.
```

-- The query result format is in the following example.
-- Activities table:
-- +------------+-------------+
-- | sell_date  | product     |
-- +------------+-------------+
-- | 2020-05-30 | Headphone   |
-- | 2020-06-01 | Pencil      |
-- | 2020-06-02 | Mask        |
-- | 2020-05-30 | Basketball  |
-- | 2020-06-01 | Bible       |
-- | 2020-06-02 | Mask        |
-- | 2020-05-30 | T-Shirt     |
-- +------------+-------------+

-- Result table:
-- +------------+----------+-----------------------------+
-- | sell_date  | num_sold | products                    |
-- +------------+----------+-----------------------------+
-- | 2020-05-30 | 3        | Basketball,Headphone,T-shirt |
-- | 2020-06-01 | 2        | Bible,Pencil                |
-- | 2020-06-02 | 1        | Mask                        |
-- +------------+----------+-----------------------------+
-- For 2020-05-30, Sold items were (Headphone, Basketball, T-shirt), we sort them lexicographically and separate them by comma.
-- For 2020-06-01, Sold items were (Pencil, Bible), we sort them lexicographically and separate them by comma.
-- For 2020-06-02, Sold item is (Mask), we just return it.

-- ======= Solution
==========

```
select sell_date, count(distinct product) as num_sold, group_concat(distinct product) as products
from activities
group by 1
order by 1
```

-- ##########################################################################
 -- ##########################################################################
 -- Question 38
-- Table: Delivery
-- +-----------------------------+---------+
-- | Column Name                 | Type    |
-- +-----------------------------+---------+
-- | delivery_id                 | int     |
-- | customer_id                 | int     |
-- | order_date                  | date    |
-- | customer_pref_delivery_date | date    |
-- +-----------------------------+---------+
-- delivery_id is the primary key of this table.
-- The table holds information about food delivery to customers that make orders at some date and specify a preferred delivery date (on the same order date or after it).

-- If the preferred delivery date of the customer is the same as the order date then the order is called immediate otherwise it's called scheduled.

-- Write an SQL query to find the percentage of immediate orders in the table, rounded to 2 decimal places.
-- The query result format is in the following example:
-- Delivery table:
-- +-------------+-------------+------------+----------------------------+
-- | delivery_id | customer_id | order_date | customer_pref_delivery_date |
-- +-------------+-------------+------------+----------------------------+
-- | 1 | 1 | 2019-08-01 | 2019-08-02 |
-- | 2 | 5 | 2019-08-02 | 2019-08-02 |
-- | 3 | 1 | 2019-08-11 | 2019-08-11 |
-- | 4 | 3 | 2019-08-24 | 2019-08-26 |
-- | 5 | 4 | 2019-08-21 | 2019-08-22 |
-- | 6 | 2 | 2019-08-11 | 2019-08-13 |
-- +-------------+-------------+------------+----------------------------+

-- Result table:
-- +----------------------+
-- | immediate_percentage |
-- +----------------------+
-- | 33.33 |
-- +----------------------+
-- The orders with delivery id 2 and 3 are immediate while the others are scheduled.

-- ======= Solution
==========

Select
Round(avg(case when order_date=customer_pref_delivery_date then 1 else 0 end)*100,2) as immediate_percentage
from delivery

-- ########################################################################
-- ########################################################################
-- Question 45
-- Table: Products
-- +------------------+---------+
-- | Column Name | Type |
-- +------------------+---------+
-- | product_id | int |
-- | product_name | varchar |
-- | product_category | varchar |
-- +------------------+---------+
-- product_id is the primary key for this table.
-- This table contains data about the company's products.
-- Table: Orders
-- +---------------+---------+
-- | Column Name | Type |
-- +---------------+---------+
-- | product_id | int |
-- | order_date | date |

-- | unit | int |
-- +---------------+---------+
-- There is no primary key for this table. It may have duplicate rows.
-- product_id is a foreign key to Products table.
-- unit is the number of products ordered in order_date.

-- Write an SQL query to get the names of products with greater than or equal to 100 units ordered in February 2020 and their amount.

-- Return result table in any order.
-- The query result format is in the following example:
-- Products table:
-- +-------------+----------------------+------------------+
-- | product_id | product_name | product_category |
-- +-------------+----------------------+------------------+
-- | 1 | Leetcode Solutions | Book |
-- | 2 | Jewels of Stringology | Book |
-- | 3 | HP | Laptop |
-- | 4 | Lenovo | Laptop |
-- | 5 | Leetcode Kit | T-shirt |
-- +-------------+----------------------+------------------+

-- Orders table:
-- +--------------+--------------+----------+
-- | product_id | order_date | unit |
-- +--------------+--------------+----------+
-- | 1 | 2020-02-05 | 60 |
-- | 1 | 2020-02-10 | 70 |
-- | 2 | 2020-01-18 | 30 |
-- | 2 | 2020-02-11 | 80 |
-- | 3 | 2020-02-17 | 2 |
-- | 3 | 2020-02-24 | 3 |
-- | 4 | 2020-03-01 | 20 |
-- | 4 | 2020-03-04 | 30 |
-- | 4 | 2020-03-04 | 60 |
-- | 5 | 2020-02-25 | 50 |
-- | 5 | 2020-02-27 | 50 |
-- | 5 | 2020-03-01 | 50 |
-- +--------------+--------------+----------+

-- Result table:
-- +--------------------+---------+
-- | product_name | unit |
-- +--------------------+---------+
-- | Leetcode Solutions | 130 |
-- | Leetcode Kit | 100 |
-- +--------------------+---------+

-- Products with product_id = 1 is ordered in February a total of (60 + 70) = 130.
-- Products with product_id = 2 is ordered in February a total of 80.
-- Products with product_id = 3 is ordered in February a total of (2 + 3) = 5.

```
-- Products with product_id = 4 was not ordered in February 2020.
-- Products with product_id = 5 is ordered in February a total of (50 + 50) = 100.

-- ======= Solution
================================================================================

Select a.product_name, a.unit
from
(select p.product_name, sum(unit) as unit
from orders o
join products p
on o.product_id = p.product_id
where month(order_date)=2 and year(order_date) = 2020
group by o.product_id) a
where a.unit>=100

-- ########################################################################
 -- ########################################################################
 -- Question 6
-- X city opened a new cinema, many people would like to go to this cinema.
-- The cinema also gives out a poster indicating the movies’ ratings and descriptions.
-- Please write a SQL query to output movies with an odd numbered ID and a description that is not 'boring'.
-- Order the result by rating.
-- For example, table cinema:
-- +---------+-----------+--------------+-----------+
-- |   id    | movie     |  description |  rating   |
-- +---------+-----------+--------------+-----------+
-- |   1     | War       |   great 3D   |   8.9     |
-- |   2     | Science   |   fiction    |   8.5     |
-- |   3     | irish     |   boring     |   6.2     |
-- |   4     | Ice song  |   Fantacy    |   8.6     |
-- |   5     | House card|   Interesting|   9.1     |
-- +---------+-----------+--------------+-----------+
-- For the example above, the output should be:
-- +---------+-----------+--------------+-----------+
-- |   id    | movie     |  description |  rating   |
-- +---------+-----------+--------------+-----------+
-- |   5     | House card|   Interesting|   9.1     |
-- |   1     | War       |   great 3D   |   8.9     |
-- +---------+-----------+--------------+-----------+

-- ======= Solution
================================================================================

Select *
from cinema
where id%2=1 and description not in ('boring')
order by rating desc

-- ########################################################################
 -- ########################################################################
```

```
-- Question 31
-- Table: Submissions
-- +---------------+----------+
-- | Column Name   | Type     |
-- +---------------+----------+
-- | sub_id        | int      |
-- | parent_id     | int      |
-- +---------------+----------+
-- There is no primary key for this table, it may have duplicate rows.
-- Each row can be a post or comment on the post.
-- parent_id is null for posts.
-- parent_id for comments is sub_id for another post in the table.

-- Write an SQL query to find number of comments per each post.

-- Result table should contain post_id and its corresponding number_of_comments,
-- and must be sorted by post_id in ascending order.
-- Submissions may contain duplicate comments. You should count the number of unique comments per post.
-- Submissions may contain duplicate posts. You should treat them as one post.
-- The query result format is in the following example:
-- Submissions table:
-- +---------+------------+
-- | sub_id  | parent_id  |
-- +---------+------------+
-- | 1       | Null       |
-- | 2       | Null       |
-- | 1       | Null       |
-- | 12      | Null       |
-- | 3       | 1          |
-- | 5       | 2          |
-- | 3       | 1          |
-- | 4       | 1          |
-- | 9       | 1          |
-- | 10      | 2          |
-- | 6       | 7          |
-- +---------+------------+

-- Result table:
-- +---------+--------------------+
-- | post_id | number_of_comments |
-- +---------+--------------------+
-- | 1       | 3                  |
-- | 2       | 2                  |
-- | 12      | 0                  |
-- +---------+--------------------+

-- The post with id 1 has three comments in the table with id 3, 4 and 9. The comment with id 3 is
-- repeated in the table, we counted it only once.
-- The post with id 2 has two comments in the table with id 5 and 10.
-- The post with id 12 has no comments in the table.
-- The comment with id 6 is a comment on a deleted post with id 7 so we ignored it.
```

-- ======= Solution
==========

```
Select a.sub_id as post_id, coalesce(b.number_of_comments,0) as number_of_comments
from(
select distinct sub_id from submissions where parent_id is null) a
left join(
select parent_id, count(distinct(sub_id)) as number_of_comments
from submissions
group by parent_id
having parent_id = any(select sub_id from submissions where parent_id is null)) b
on a.sub_id = b.parent_id
order by post_id
```

```
-- ##########################################################################
 -- ##########################################################################
 -- Question 30
-- Table: Sales
-- +-------------+-------+
-- | Column Name | Type  |
-- +-------------+-------+
-- | sale_id     | int   |
-- | product_id  | int   |
-- | year        | int   |
-- | quantity    | int   |
-- | price       | int   |
-- +-------------+-------+
-- (sale_id, year) is the primary key of this table.
-- product_id is a foreign key to Product table.
-- Note that the price is per unit.
-- Table: Product
-- +--------------+---------+
-- | Column Name  | Type    |
-- +--------------+---------+
-- | product_id   | int     |
-- | product_name | varchar |
-- +--------------+---------+
-- product_id is the primary key of this table.

-- Write an SQL query that reports all product names of the products in the Sales table along with their selling year and price.
-- For example:
-- Sales table:
-- +---------+------------+------+----------+-------+
-- | sale_id | product_id | year | quantity | price |
-- +---------+------------+------+----------+-------+
-- | 1       | 100        | 2008 | 10       | 5000  |
-- | 2       | 100        | 2009 | 12       | 5000  |
-- | 7       | 200        | 2011 | 15       | 9000  |
-- +---------+------------+------+----------+-------+
```

```
-- Product table:
-- +------------+--------------+
-- | product_id | product_name |
-- +------------+--------------+
-- | 100        | Nokia        |
-- | 200        | Apple        |
-- | 300        | Samsung      |
-- +------------+--------------+

-- Result table:
-- +--------------+-------+-------+
-- | product_name | year  | price |
-- +--------------+-------+-------+
-- | Nokia        | 2008  | 5000  |
-- | Nokia        | 2009  | 5000  |
-- | Apple        | 2011  | 9000  |
-- +--------------+-------+-------+

-- ======= Solution
================================================================================

Select a.product_name, b.year, b.price
from product as a
join
sales as b
on a.product_id = b.product_id

-- ##########################################################################
 -- ##########################################################################
 -- Question 29
-- Table: Sales
-- +-------------+-------+
-- | Column Name | Type  |
-- +-------------+-------+
-- | sale_id     | int   |
-- | product_id  | int   |
-- | year        | int   |
-- | quantity    | int   |
-- | price       | int   |
-- +-------------+-------+
-- sale_id is the primary key of this table.
-- product_id is a foreign key to Product table.
-- Note that the price is per unit.
-- Table: Product
-- +--------------+---------+
-- | Column Name  | Type    |
-- +--------------+---------+
-- | product_id   | int     |
-- | product_name | varchar |
-- +--------------+---------+
```

-- product_id is the primary key of this table.

-- Write an SQL query that reports the total quantity sold for every product id.
-- The query result format is in the following example:
-- Sales table:
-- +---------+------------+------+----------+-------+
-- | sale_id | product_id | year | quantity | price |
-- +---------+------------+------+----------+-------+
-- | 1 | 100 | 2008 | 10 | 5000 |
-- | 2 | 100 | 2009 | 12 | 5000 |
-- | 7 | 200 | 2011 | 15 | 9000 |
-- +---------+------------+------+----------+-------+
-- Product table:
-- +------------+--------------+
-- | product_id | product_name |
-- +------------+--------------+
-- | 100 | Nokia |
-- | 200 | Apple |
-- | 300 | Samsung |
-- +------------+--------------+
-- Result table:
-- +--------------+----------------+
-- | product_id | total_quantity |
-- +--------------+----------------+
-- | 100 | 22 |
-- | 200 | 15 |
-- +--------------+----------------+

-- ======= Solution
==========

Select a.product_id, sum(a.quantity) as total_quantity
from sales a
join
product b
on a.product_id = b.product_id
group by a.product_id

-- ##########################################################################
-- ##########################################################################
-- Question 26
-- Table: Project
-- +-------------+---------+
-- | Column Name | Type |
-- +-------------+---------+
-- | project_id | int |
-- | employee_id | int |
-- +-------------+---------+
-- (project_id, employee_id) is the primary key of this table.
-- employee_id is a foreign key to Employee table.
-- Table: Employee

```
-- +------------------+---------+
-- | Column Name      | Type    |
-- +------------------+---------+
-- | employee_id      | int     |
-- | name             | varchar |
-- | experience_years | int     |
-- +------------------+---------+
-- employee_id is the primary key of this table.

-- Write an SQL query that reports the average experience years of all the employees for each project, rounded to 2 digits.

-- The query result format is in the following example:
-- Project table:
-- +-------------+-------------+
-- | project_id  | employee_id |
-- +-------------+-------------+
-- | 1           | 1           |
-- | 1           | 2           |
-- | 1           | 3           |
-- | 2           | 1           |
-- | 2           | 4           |
-- +-------------+-------------+
-- Employee table:
-- +-------------+--------+------------------+
-- | employee_id | name   | experience_years |
-- +-------------+--------+------------------+
-- | 1           | Khaled | 3                |
-- | 2           | Ali    | 2                |
-- | 3           | John   | 1                |
-- | 4           | Doe    | 2                |
-- +-------------+--------+------------------+
-- Result table:
-- +-------------+---------------+
-- | project_id  | average_years |
-- +-------------+---------------+
-- | 1           | 2.00          |
-- | 2           | 2.50          |
-- +-------------+---------------+
-- The average experience years for the first project is (3 + 2 + 1) / 3 = 2.00 and for the second project is (3 + 2) / 2 = 2.50
-- ======= Solution
================================================================================

Select a.project_id, round(sum(b.experience_years)/count(b.employee_id),2) as average_years
from project as a
join
employee as b
on a.employee_id=b.employee_id
group by a.project_id

-- ######################################################################
```

```
-- ##########################################################################
-- Question 28
-- Table: Project
-- +-------------+---------+
-- | Column Name | Type    |
-- +-------------+---------+
-- | project_id  | int     |
-- | employee_id | int     |
-- +-------------+---------+
-- (project_id, employee_id) is the primary key of this table.
-- employee_id is a foreign key to Employee table.
-- Table: Employee
-- +------------------+---------+
-- | Column Name      | Type    |
-- +------------------+---------+
-- | employee_id      | int     |
-- | name             | varchar |
-- | experience_years | int     |
-- +------------------+---------+
-- employee_id is the primary key of this table.

-- Write an SQL query that reports all the projects that have the most employees.
-- The query result format is in the following example:
-- Project table:
-- +-------------+-------------+
-- | project_id  | employee_id |
-- +-------------+-------------+
-- | 1           | 1           |
-- | 1           | 2           |
-- | 1           | 3           |
-- | 2           | 1           |
-- | 2           | 4           |
-- +-------------+-------------+

-- Employee table:
-- +-------------+--------+------------------+
-- | employee_id | name   | experience_years |
-- +-------------+--------+------------------+
-- | 1           | Khaled | 3                |
-- | 2           | Ali    | 2                |
-- | 3           | John   | 1                |
-- | 4           | Doe    | 2                |
-- +-------------+--------+------------------+

-- Result table:
-- +-------------+
-- | project_id  |
-- +-------------+
-- | 1           |
-- +-------------+
-- The first project has 3 employees while the second one has 2.
```

-- ======= Solution
==========

```
select a.project_id
from(
select project_id,
rank() over(order by count(employee_id) desc) as rk
from project
group by project_id) a
where a.rk = 1
```

-- ##########################################################################
-- ##########################################################################
-- Question 41
-- Table: Queries
-- +-------------+---------+
-- | Column Name | Type    |
-- +-------------+---------+
-- | query_name  | varchar |
-- | result      | varchar |
-- | position    | int     |
-- | rating      | int     |
-- +-------------+---------+
-- There is no primary key for this table, it may have duplicate rows.
-- This table contains information collected from some queries on a database.
-- The position column has a value from 1 to 500.
-- The rating column has a value from 1 to 5. Query with rating less than 3 is a poor query.

-- We define query quality as:

-- The average of the ratio between query rating and its position.
-- We also define poor query percentage as:
-- The percentage of all queries with rating less than 3.
-- Write an SQL query to find each query_name, the quality and poor_query_percentage.

-- Both quality and poor_query_percentage should be rounded to 2 decimal places.
-- The query result format is in the following example:
-- Queries table:
-- +------------+------------------+----------+--------+
-- | query_name | result           | position | rating |
-- +------------+------------------+----------+--------+
-- | Dog        | Golden Retriever | 1        | 5      |
-- | Dog        | German Shepherd  | 2        | 5      |
-- | Dog        | Mule             | 200      | 1      |
-- | Cat        | Shirazi          | 5        | 2      |
-- | Cat        | Siamese          | 3        | 3      |
-- | Cat        | Sphynx           | 7        | 4      |
-- +------------+------------------+----------+--------+

-- Result table:

```
-- +------------+---------+----------------------+
-- | query_name | quality | poor_query_percentage |
-- +------------+---------+----------------------+
-- | Dog        | 2.50    | 33.33                |
-- | Cat        | 0.66    | 33.33                |
-- +------------+---------+----------------------+

-- Dog queries quality is ((5 / 1) + (5 / 2) + (1 / 200)) / 3 = 2.50
-- Dog queries poor_ query_percentage is (1 / 3) * 100 = 33.33

-- Cat queries quality equals ((2 / 5) + (3 / 3) + (4 / 7)) / 3 = 0.66
-- Cat queries poor_ query_percentage is (1 / 3) * 100 = 33.33

-- ======= Solution
================================================================================

Select query_name, round(sum(rating/position)/count(*),2) as quality,
round(avg(case when rating<3 then 1 else 0 end)*100,2) as poor_query_percentage
from queries
group by query_name

-- ##########################################################################
 -- ##########################################################################
 -- Question 44
-- Table: Department
-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | id            | int     |
-- | revenue       | int     |
-- | month         | varchar |
-- +---------------+---------+
-- (id, month) is the primary key of this table.
-- The table has information about the revenue of each department per month.
-- The month has values in ["Jan","Feb","Mar","Apr","May","Jun","Jul","Aug","Sep","Oct","Nov","Dec"].

-- Write an SQL query to reformat the table such that there is a department id column and a revenue column for each
month.

-- The query result format is in the following example:
-- Department table:
-- +------+---------+-------+
-- | id   | revenue | month |
-- +------+---------+-------+
-- | 1    | 8000    | Jan   |
-- | 2    | 9000    | Jan   |
-- | 3    | 10000   | Feb   |
-- | 1    | 7000    | Feb   |
-- | 1    | 6000    | Mar   |
-- +------+---------+-------+
```

```
-- Result table:
-- +------+-------------+-------------+-------------+-----+-------------+
-- | id   | Jan_Revenue | Feb_Revenue | Mar_Revenue | ... | Dec_Revenue |
-- +------+-------------+-------------+-------------+-----+-------------+
-- | 1    | 8000        | 7000        | 6000        | ... | null        |
-- | 2    | 9000        | null        | null        | ... | null        |
-- | 3    | null        | 10000       | null        | ... | null        |
-- +------+-------------+-------------+-------------+-----+-------------+
-- Note that the result table has 13 columns (1 for the department id + 12 for the months).

-- ======= Solution
================================================================================

select id,
sum(if(month='Jan',revenue,null)) as Jan_Revenue,
sum(if(month='Feb',revenue,null)) as Feb_Revenue,
sum(if(month='Mar',revenue,null)) as Mar_Revenue,
sum(if(month='Apr',revenue,null)) as Apr_Revenue,
sum(if(month='May',revenue,null)) as May_Revenue,
sum(if(month='Jun',revenue,null)) as Jun_Revenue,
sum(if(month='Jul',revenue,null)) as Jul_Revenue,
sum(if(month='Aug',revenue,null)) as Aug_Revenue,
sum(if(month='Sep',revenue,null)) as Sep_Revenue,
sum(if(month='Oct',revenue,null)) as Oct_Revenue,
sum(if(month='Nov',revenue,null)) as Nov_Revenue,
sum(if(month='Dec',revenue,null)) as Dec_Revenue
from Department
group by id

-- ##########################################################################
 -- ##########################################################################
 -- Question 48
-- Table: Employees
-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | id            | int     |
-- | name          | varchar |
-- +---------------+---------+
-- id is the primary key for this table.
-- Each row of this table contains the id and the name of an employee in a company.
-- Table: EmployeeUNI
-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | id            | int     |
-- | unique_id     | int     |
-- +---------------+---------+
-- (id, unique_id) is the primary key for this table.
-- Each row of this table contains the id and the corresponding unique id of an employee in the company.
```

-- Write an SQL query to show the unique ID of each user, If a user doesn't have a unique ID replace just show null.

-- Return the result table in any order.
-- The query result format is in the following example:
-- Employees table:
-- +----+----------+
-- | id | name     |
-- +----+----------+
-- | 1  | Alice    |
-- | 7  | Bob      |
-- | 11 | Meir     |
-- | 90 | Winston  |
-- | 3  | Jonathan |
-- +----+----------+

-- EmployeeUNI table:
-- +----+-----------+
-- | id | unique_id |
-- +----+-----------+
-- | 3  | 1         |
-- | 11 | 2         |
-- | 90 | 3         |
-- +----+-----------+

-- EmployeeUNI table:
-- +-----------+----------+
-- | unique_id | name     |
-- +-----------+----------+
-- | null      | Alice    |
-- | null      | Bob      |
-- | 2         | Meir     |
-- | 3         | Winston  |
-- | 1         | Jonathan |
-- +-----------+----------+

-- Alice and Bob don't have a unique ID, We will show null instead.
-- The unique ID of Meir is 2.
-- The unique ID of Winston is 3.
-- The unique ID of Jonathan is 1.

-- ======= Solution
==========

```
select unique_id, name
from employees e
left join
employeeuni u
on e.id = u.id
order by e.id
```

-- ##########

```
-- ##########################################################################
-- Question 43
-- Table: Actions
-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | user_id       | int     |
-- | post_id       | int     |
-- | action_date   | date    |
-- | action        | enum    |
-- | extra         | varchar |
-- +---------------+---------+
-- There is no primary key for this table, it may have duplicate rows.
-- The action column is an ENUM type of ('view', 'like', 'reaction', 'comment', 'report', 'share').
-- The extra column has optional information about the action such as a reason for report or a type of reaction.

-- Write an SQL query that reports the number of posts reported yesterday for each report reason. Assume today is 2019-07-05.
-- The query result format is in the following example:
-- Actions table:
-- +---------+---------+-------------+--------+--------+
-- | user_id | post_id | action_date | action | extra  |
-- +---------+---------+-------------+--------+--------+
-- | 1       | 1       | 2019-07-01  | view   | null   |
-- | 1       | 1       | 2019-07-01  | like   | null   |
-- | 1       | 1       | 2019-07-01  | share  | null   |
-- | 2       | 4       | 2019-07-04  | view   | null   |
-- | 2       | 4       | 2019-07-04  | report | spam   |
-- | 3       | 4       | 2019-07-04  | view   | null   |
-- | 3       | 4       | 2019-07-04  | report | spam   |
-- | 4       | 3       | 2019-07-02  | view   | null   |
-- | 4       | 3       | 2019-07-02  | report | spam   |
-- | 5       | 2       | 2019-07-04  | view   | null   |
-- | 5       | 2       | 2019-07-04  | report | racism |
-- | 5       | 5       | 2019-07-04  | view   | null   |
-- | 5       | 5       | 2019-07-04  | report | racism |
-- +---------+---------+-------------+--------+--------+

-- Result table:
-- +---------------+--------------+
-- | report_reason | report_count |
-- +---------------+--------------+
-- | spam          | 1            |
-- | racism        | 2            |
-- +---------------+--------------+
-- Note that we only care about report reasons with non zero number of reports.

-- ======= Solution
================================================================================

Select extra as report_reason, count(distinct post_id) as report_count
```

```
from actions
where action_date = DATE_SUB("2019-07-5", INTERVAL 1 DAY) and action='report'
group by extra

-- ######################################################################
 -- ######################################################################
 -- Question 12
-- Given a Weather table, write a SQL query to find all dates' Ids with higher temperature compared to its previous (yesterday's) dates.
-- +---------+------------------+------------------+
-- | Id(INT) | RecordDate(DATE) | Temperature(INT) |
-- +---------+------------------+------------------+
-- |       1 |       2015-01-01 |             10 |
-- |       2 |       2015-01-02 |             25 |
-- |       3 |       2015-01-03 |             20 |
-- |       4 |       2015-01-04 |             30 |
-- +---------+------------------+------------------+
-- For example, return the following Ids for the above Weather table:

-- +----+
-- | Id |
-- +----+
-- |  2 |
-- |  4 |
-- +----+

-- ======= Solution
================================================================================

select a.Id
from weather a, weather b
where a.Temperature>b.Temperature and  datediff(a.recorddate,b.recorddate)=1

-- ######################################################################
 -- ######################################################################
 -- Question 27
-- Table: Product
-- +--------------+---------+
-- | Column Name  | Type    |
-- +--------------+---------+
-- | product_id   | int     |
-- | product_name | varchar |
-- | unit_price   | int     |
-- +--------------+---------+
-- product_id is the primary key of this table.
-- Table: Sales
-- +-------------+---------+
-- | Column Name | Type    |
-- +-------------+---------+
-- | seller_id   | int     |
-- | product_id  | int     |
```

```
-- | buyer_id    | int     |
-- | sale_date   | date    |
-- | quantity    | int     |
-- | price       | int     |
-- +------ ------+---------+
-- This table has no primary key, it can have repeated rows.
-- product_id is a foreign key to Product table.

-- Write an SQL query that reports the best seller by total sales price, If there is a tie, report them all.

-- The query result format is in the following example:
-- Product table:
-- +------------+--------------+------------+
-- | product_id | product_name | unit_price |
-- +------------+--------------+------------+
-- | 1          | S8           | 1000       |
-- | 2          | G4           | 800        |
-- | 3          | iPhone       | 1400       |
-- +------------+--------------+------------+
-- Sales table:
-- +-----------+------------+----------+------------+----------+-------+
-- | seller_id | product_id | buyer_id | sale_date  | quantity | price |
-- +-----------+------------+----------+------------+----------+-------+
-- | 1         | 1          | 1        | 2019-01-21 | 2        | 2000  |
-- | 1         | 2          | 2        | 2019-02-17 | 1        | 800   |
-- | 2         | 2          | 3        | 2019-06-02 | 1        | 800   |
-- | 3         | 3          | 4        | 2019-05-13 | 2        | 2800  |
-- +-----------+------------+----------+------------+----------+-------+
-- Result table:
-- +-------------+
-- | seller_id   |
-- +-------------+
-- | 1           |
-- | 3           |
-- +-------------+
-- Both sellers with id 1 and 3 sold products with the most total price of 2800.

-- ======= Solution
================================================================================

Select a.seller_id
from
(select seller_id,
rank() over(order by sum(price) desc) as rk
from sales
group by seller_id) a
where a.rk=1

-- ###################################################################
 -- ###################################################################
 -- Question 33
```

```
-- Table: Product
-- +--------------+---------+
-- | Column Name  | Type    |
-- +--------------+---------+
-- | product_id   | int     |
-- | product_name | varchar |
-- | unit_price   | int     |
-- +--------------+---------+
-- product_id is the primary key of this table.
-- Table: Sales
-- +-------------+---------+
-- | Column Name | Type    |
-- +-------------+---------+
-- | seller_id   | int     |
-- | product_id  | int     |
-- | buyer_id    | int     |
-- | sale_date   | date    |
-- | quantity    | int     |
-- | price       | int     |
-- +------ ------+---------+
-- This table has no primary key, it can have repeated rows.
-- product_id is a foreign key to Product table.

-- Write an SQL query that reports the buyers who have bought S8 but not iPhone. Note that S8 and iPhone are products present in the Product table.

-- The query result format is in the following example:
-- Product table:
-- +------------+--------------+------------+
-- | product_id | product_name | unit_price |
-- +------------+--------------+------------+
-- | 1          | S8           | 1000       |
-- | 2          | G4           | 800        |
-- | 3          | iPhone       | 1400       |
-- +------------+--------------+------------+
-- Sales table:
-- +-----------+------------+----------+------------+----------+-------+
-- | seller_id | product_id | buyer_id | sale_date  | quantity | price |
-- +-----------+------------+----------+------------+----------+-------+
-- | 1         | 1          | 1        | 2019-01-21 | 2        | 2000  |
-- | 1         | 2          | 2        | 2019-02-17 | 1        | 800   |
-- | 2         | 1          | 3        | 2019-06-02 | 1        | 800   |
-- | 3         | 3          | 3        | 2019-05-13 | 2        | 2800  |
-- +-----------+------------+----------+------------+----------+-------+
-- Result table:
-- +-------------+
-- | buyer_id    |
-- +-------------+
-- | 1           |
-- +-------------+
-- The buyer with id 1 bought an S8 but didn't buy an iPhone. The buyer with id 3 bought both.
```

-- ======= Solution
==========

```
Select distinct a.buyer_id
from sales a join
product b
on a.product_id = b.product_id
where a.buyer_id in
(Select a.buyer_id from sales a join product b on a.product_id = b.product_id where b.product_name = 'S8')
and
a.buyer_id not in (Select a.buyer_id from sales a join product b on a.product_id = b.product_id where b.product_name =
'iPhone')
```

```
-- ##########################################################################
-- Question 34
-- Table: Product
-- +--------------+---------+
-- | Column Name  | Type    |
-- +--------------+---------+
-- | product_id   | int     |
-- | product_name | varchar |
-- | unit_price   | int     |
-- +--------------+---------+
-- product_id is the primary key of this table.
-- Table: Sales
-- +-------------+---------+
-- | Column Name | Type    |
-- +-------------+---------+
-- | seller_id   | int     |
-- | product_id  | int     |
-- | buyer_id    | int     |
-- | sale_date   | date    |
-- | quantity    | int     |
-- | price       | int     |
-- +------ ------+---------+
-- This table has no primary key, it can have repeated rows.
-- product_id is a foreign key to Product table.

-- Write an SQL query that reports the products that were only sold in spring 2019. That is, between 2019-01-01 and
2019-03-31 inclusive.

-- The query result format is in the following example:
-- Product table:
-- +------------+--------------+------------+
-- | product_id | product_name | unit_price |
-- +------------+--------------+------------+
-- | 1          | S8           | 1000       |
-- | 2          | G4           | 800        |
-- | 3          | iPhone       | 1400       |
```

```
-- +------------+--------------+------------+
-- Sales table:
-- +-----------+------------+----------+------------+----------+-------+
-- | seller_id | product_id | buyer_id | sale_date  | quantity | price |
-- +-----------+------------+----------+------------+----------+-------+
-- | 1         | 1          | 1        | 2019-01-21 | 2        | 2000  |
-- | 1         | 2          | 2        | 2019-02-17 | 1        | 800   |
-- | 2         | 2          | 3        | 2019-06-02 | 1        | 800   |
-- | 3         | 3          | 4        | 2019-05-13 | 2        | 2800  |
-- +-----------+------------+----------+------------+----------+-------+
-- Result table:
-- +-------------+--------------+
-- | product_id  | product_name |
-- +-------------+--------------+
-- | 1           | S8           |
-- +-------------+--------------+
-- The product with id 1 was only sold in spring 2019 while the other two were sold after.

-- ======= Solution
================================================================================

select distinct a.product_id, product_name from sales a join product b on a.product_id = b.product_id where
a.product_id
in
(select product_id from sales where sale_date >= '2019-01-01' and sale_date <= '2019-03-31')
and
a.product_id not in
(select product_id from sales where sale_date > '2019-03-31' or sale_date < '2019-01-01')

-- ########################################################################
 -- Question 12
-- Description
-- Given three tables: salesperson, company, orders.
-- Output all the names in the table salesperson, who didn't have sales to company 'RED'.
-- Example
-- Input
-- Table: salesperson
-- +----------+------+--------+-----------------+-----------+
-- | sales_id | name | salary | commission_rate | hire_date |
-- +----------+------+--------+-----------------+-----------+
-- |   1      | John | 100000 |     6           | 4/1/2006  |
-- |   2      | Amy  | 120000 |     5           | 5/1/2010  |
-- |   3      | Mark | 65000  |     12          | 12/25/2008|
-- |   4      | Pam  | 25000  |     25          | 1/1/2005  |
-- |   5      | Alex | 50000  |     10          | 2/3/2007  |
-- +----------+------+--------+-----------------+-----------+
-- The table salesperson holds the salesperson information. Every salesperson has a sales_id and a name.
-- Table: company
-- +---------+--------+------------+
-- | com_id  |  name  |    city    |
-- +---------+--------+------------+
```

```
-- |   1    |  RED   |   Boston   |
-- |   2    | ORANGE |   New York |
-- |   3    | YELLOW |   Boston   |
-- |   4    | GREEN  |   Austin   |
-- +---------+--------+------------+
-- The table company holds the company information. Every company has a com_id and a name.
-- Table: orders
-- +----------+------------+---------+----------+--------+
-- | order_id | order_date | com_id  | sales_id | amount |
-- +----------+------------+---------+----------+--------+
-- | 1        |   1/1/2014 |    3    |    4     | 100000 |
-- | 2        |   2/1/2014 |    4    |    5     | 5000   |
-- | 3        |   3/1/2014 |    1    |    1     | 50000  |
-- | 4        |   4/1/2014 |    1    |    4     | 25000  |
-- +----------+----------+---------+----------+--------+
-- The table orders holds the sales record information, salesperson and customer company are represented by sales_id and com_id.
-- output
-- +------+
-- | name |
-- +------+
-- | Amy  |
-- | Mark |
-- | Alex |
-- +------+
-- Explanation

-- According to order '3' and '4' in table orders, it is easy to tell only salesperson 'John' and 'Pam' have sales to company 'RED',
-- so we need to output all the other names in the table salesperson.

-- ======= Solution
================================================================================

# Takes higher time
# Select distinct a.name
# from(
# select s.sales_id as sales, name
# from salesperson s left join orders o
# on s.sales_id = o.sales_id) a
# where a.sales != all(select distinct sales_id from orders o join company c on o.com_id = c.com_id where o.com_id = any (select com_id from company where name = 'RED'))

# Faster solution
SELECT name
FROM salesperson
WHERE sales_id NOT IN (SELECT DISTINCT sales_id
FROM orders
WHERE com_id = (SELECT com_id
FROM company
WHERE name = 'RED')) ;
```

```
-- ######################################################################
 -- Question 15
-- Write a SQL query to get the second highest salary from the Employee table.
-- +----+--------+
-- | Id | Salary |
-- +----+--------+
-- | 1  | 100    |
-- | 2  | 200    |
-- | 3  | 300    |
-- +----+--------+
-- For example, given the above Employee table, the query should return 200 as the second highest salary.
-- If there is no second highest salary, then the query should return null.
-- +---------------------+
-- | SecondHighestSalary |
-- +---------------------+
-- | 200                 |
-- +---------------------+

-- ======= Solution
================================================================================

select max(salary) as SecondHighestSalary
from employee
where salary ! = (Select max(salary)
                  from employee)


 -- ######################################################################
 -- Question 25
-- Table point holds the x coordinate of some points on x-axis in a plane, which are all integers.

-- Write a query to find the shortest distance between two points in these points.
-- | x   |
-- |-----|
-- | -1  |
-- | 0   |
-- | 2   |

-- The shortest distance is '1' obviously, which is from point '-1' to '0'. So the output is as below:
-- | shortest|
-- |---------|
-- | 1       |

-- Note: Every point is unique, which means there is no duplicates in table point

-- ======= Solution
================================================================================

select min(abs(abs(a.x)-abs(a.next_closest))) as shortest
from(
```

```
select *,
lead(x) over(order by x) as next_closest
from point) a

 -- ##########################################################################
 -- Question 21
-- Table: ActorDirector
-- +-------------+---------+
-- | Column Name | Type    |
-- +-------------+---------+
-- | actor_id    | int     |
-- | director_id | int     |
-- | timestamp   | int     |
-- +-------------+---------+
-- timestamp is the primary key column for this table.

-- Write a SQL query for a report that provides the pairs (actor_id, director_id) where the actor have cooperated with the director at least 3 times.

-- Example:
-- ActorDirector table:
-- +-------------+-------------+-------------+
-- | actor_id    | director_id | timestamp   |
-- +-------------+-------------+-------------+
-- | 1           | 1           | 0           |
-- | 1           | 1           | 1           |
-- | 1           | 1           | 2           |
-- | 1           | 2           | 3           |
-- | 1           | 2           | 4           |
-- | 2           | 1           | 5           |
-- | 2           | 1           | 6           |
-- +-------------+-------------+-------------+
-- Result table:
-- +-------------+-------------+
-- | actor_id    | director_id |
-- +-------------+-------------+
-- | 1           | 1           |
-- +-------------+-------------+
-- The only pair is (1, 1) where they cooperated exactly 3 times.

-- ======= Solution
================================================================================

Select actor_id, director_id
from actordirector
group by actor_id, director_id
having count(*)>=3

 -- ##########################################################################
 -- Question 13
-- Table: Ads
```

```
-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | ad_id         | int     |
-- | user_id       | int     |
-- | action        | enum    |
-- +---------------+---------+
-- (ad_id, user_id) is the primary key for this table.
-- Each row of this table contains the ID of an Ad, the ID of a user and the action taken by this user regarding this Ad.
-- The action column is an ENUM type of ('Clicked', 'Viewed', 'Ignored').

-- A company is running Ads and wants to calculate the performance of each Ad.
-- Performance of the Ad is measured using Click-Through Rate (CTR) where:

-- Write an SQL query to find the ctr of each Ad.
-- Round ctr to 2 decimal points. Order the result table by ctr in descending order and by ad_id in ascending order in case of a tie.
-- The query result format is in the following example:
-- Ads table:
-- +-------+---------+---------+
-- | ad_id | user_id | action  |
-- +-------+---------+---------+
-- | 1     | 1       | Clicked |
-- | 2     | 2       | Clicked |
-- | 3     | 3       | Viewed  |
-- | 5     | 5       | Ignored |
-- | 1     | 7       | Ignored |
-- | 2     | 7       | Viewed  |
-- | 3     | 5       | Clicked |
-- | 1     | 4       | Viewed  |
-- | 2     | 11      | Viewed  |
-- | 1     | 2       | Clicked |
-- +-------+---------+---------+
-- Result table:
-- +-------+-------+
-- | ad_id | ctr   |
-- +-------+-------+
-- | 1     | 66.67 |
-- | 3     | 50.00 |
-- | 2     | 33.33 |
-- | 5     | 0.00  |
-- +-------+-------+
-- for ad_id = 1, ctr = (2/(2+1)) * 100 = 66.67
-- for ad_id = 2, ctr = (1/(1+2)) * 100 = 33.33
-- for ad_id = 3, ctr = (1/(1+1)) * 100 = 50.00
-- for ad_id = 5, ctr = 0.00, Note that ad_id = 5 has no clicks or views.
-- Note that we don't care about Ignored Ads.
-- Result table is ordered by the ctr. in case of a tie we order them by ad_id

-- ======= Solution
================================================================================
```

```
with t1 as(
select ad_id, sum(case when action in ('Clicked') then 1 else 0 end) as clicked
from ads
group by ad_id
)

, t2 as
(
Select ad_id as ad, sum(case when action in ('Clicked','Viewed') then 1 else 0 end) as total
from ads
group by ad_id
)

Select a.ad_id, coalesce(round((clicked +0.0)/nullif((total +0.0),0)*100,2),0) as ctr
from
(
select *
from t1 join t2
on t1.ad_id = t2.ad) a
order by ctr desc, ad_id

 -- ##########################################################################
 -- Question 42
-- Table: Views
-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | article_id    | int     |
-- | author_id     | int     |
-- | viewer_id     | int     |
-- | view_date     | date    |
-- +---------------+---------+
-- There is no primary key for this table, it may have duplicate rows.
-- Each row of this table indicates that some viewer viewed an article (written by some author) on some date.
-- Note that equal author_id and viewer_id indicate the same person.

-- Write an SQL query to find all the authors that viewed at least one of their own articles, sorted in ascending order by their id.
-- The query result format is in the following example:
-- Views table:
-- +------------+-----------+-----------+------------+
-- | article_id | author_id | viewer_id | view_date  |
-- +------------+-----------+-----------+------------+
-- | 1          | 3         | 5         | 2019-08-01 |
-- | 1          | 3         | 6         | 2019-08-02 |
-- | 2          | 7         | 7         | 2019-08-01 |
-- | 2          | 7         | 6         | 2019-08-02 |
-- | 4          | 7         | 1         | 2019-07-22 |
-- | 3          | 4         | 4         | 2019-07-21 |
-- | 3          | 4         | 4         | 2019-07-21 |
```

```
-- +------------+-----------+-----------+------------+
-- Result table:
-- +------+
-- | id   |
-- +------+
-- | 4    |
-- | 7    |
-- +------+

-- ======= Solution
================================================================================

select distinct author_id as id
from views
where author_id = viewer_id
order by author_id

 -- ######################################################################
 -- Question 39
-- Table: Prices
-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | product_id    | int     |
-- | start_date    | date    |
-- | end_date      | date    |
-- | price         | int     |
-- +---------------+---------+
-- (product_id, start_date, end_date) is the primary key for this table.
-- Each row of this table indicates the price of the product_id in the period from start_date to end_date.
-- For each product_id there will be no two overlapping periods. That means there will be no two intersecting periods for the same product_id.
-- Table: UnitsSold
-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | product_id    | int     |
-- | purchase_date | date    |
-- | units         | int     |
-- +---------------+---------+
-- There is no primary key for this table, it may contain duplicates.
-- Each row of this table indicates the date, units and product_id of each product sold.

-- Write an SQL query to find the average selling price for each product.

-- average_price should be rounded to 2 decimal places.
-- The query result format is in the following example:
-- Prices table:
-- +------------+------------+------------+--------+
-- | product_id | start_date | end_date   | price  |
-- +------------+------------+------------+--------+
```

```
-- | 1          | 2019-02-17 | 2019-02-28 | 5      |
-- | 1          | 2019-03-01 | 2019-03-22 | 20     |
-- | 2          | 2019-02-01 | 2019-02-20 | 15     |
-- | 2          | 2019-02-21 | 2019-03-31 | 30     |
-- +------------+------------+------------+--------+
-- UnitsSold table:
-- +------------+---------------+-------+
-- | product_id | purchase_date | units |
-- +------------+---------------+-------+
-- | 1          | 2019-02-25    | 100   |
-- | 1          | 2019-03-01    | 15    |
-- | 2          | 2019-02-10    | 200   |
-- | 2          | 2019-03-22    | 30    |
-- +------------+---------------+-------+
-- Result table:
-- +------------+---------------+
-- | product_id | average_price |
-- +------------+---------------+
-- | 1          | 6.96          |
-- | 2          | 16.96         |
-- +------------+---------------+
-- Average selling price = Total Price of Product / Number of products sold.
-- Average selling price for product 1 = ((100 * 5) + (15 * 20)) / 115 = 6.96
-- Average selling price for product 2 = ((200 * 15) + (30 * 30)) / 230 = 16.96

-- ======= Solution
================================================================================

Select d.product_id, round((sum(price*units)+0.00)/(sum(units)+0.00),2) as average_price
from(
Select *
from prices p
natural join
unitssold u
where u.purchase_date between p.start_date and p.end_date) d
group by d.product_id

 -- ########################################################################
 -- Question 5
-- There is a table World
-- +-----------------+------------+------------+--------------+---------------+
-- | name            | continent  | area       | population   | gdp           |
-- +-----------------+------------+------------+--------------+---------------+
-- | Afghanistan     | Asia       | 652230     | 25500100     | 20343000      |
-- | Albania         | Europe     | 28748      | 2831741      | 12960000      |
-- | Algeria         | Africa     | 2381741    | 37100000     | 188681000     |
-- | Andorra         | Europe     | 468        | 78115        | 3712000       |
-- | Angola          | Africa     | 1246700    | 20609294     | 100990000     |
-- +-----------------+------------+------------+--------------+---------------+
-- A country is big if it has an area of bigger than 3 million square km or a population of more than 25 million.
```

-- Write a SQL solution to output big countries' name, population and area.

-- For example, according to the above table, we should output:
-- +--------------+-------------+--------------+
-- | name         | population  | area         |
-- +--------------+-------------+--------------+
-- | Afghanistan  | 25500100    | 652230       |
-- | Algeria      | 37100000    | 2381741      |
-- +--------------+-------------+--------------+

-- ======= Solution
==========

Select name, population, area
from world
where population > 25000000 OR area>3000000

-- ######################################################################
-- Question 24
-- Table my_numbers contains many numbers in column num including duplicated ones.
-- Can you write a SQL query to find the biggest number, which only appears once.
-- +---+
-- |num|
-- +---+
-- | 8 |
-- | 8 |
-- | 3 |
-- | 3 |
-- | 1 |
-- | 4 |
-- | 5 |
-- | 6 |
-- For the sample data above, your query should return the following result:
-- +---+
-- |num|
-- +---+
-- | 6 |
-- Note:
-- If there is no such number, just output null.

-- ======= Solution
==========

Select max(a.num) as num
from
(
  select num, count(*)
  from my_numbers
  group by num
  having count(*)=1
) a

```
-- ###########################################################################
-- Question7
-- There is a table courses with columns: student and class
-- Please list out all classes which have more than or equal to 5 students.
-- For example, the table:
-- +---------+------------+
-- | student | class      |
-- +---------+------------+
-- | A       | Math       |
-- | B       | English    |
-- | C       | Math       |
-- | D       | Biology    |
-- | E       | Math       |
-- | F       | Computer   |
-- | G       | Math       |
-- | H       | Math       |
-- | I       | Math       |
-- +---------+------------+

-- ======= Solution
================================================================================

select class
from courses
group by class
having count(distinct student)>=5

-- ###########################################################################
-- Question 14
-- Table: Person
-- +-------------+---------+
-- | Column Name | Type    |
-- +-------------+---------+
-- | PersonId    | int     |
-- | FirstName   | varchar |
-- | LastName    | varchar |
-- +-------------+---------+
-- PersonId is the primary key column for this table.
-- Table: Address
-- +-------------+---------+
-- | Column Name | Type    |
-- +-------------+---------+
-- | AddressId   | int     |
-- | PersonId    | int     |
-- | City        | varchar |
-- | State       | varchar |
-- +-------------+---------+
-- AddressId is the primary key column for this table.

-- Write a SQL query for a report that provides the following information for each person in the Person table,
```

-- regardless if there is an address for each of those people:

-- FirstName, LastName, City, State

-- ======= Solution
==========

```
select FirstName, LastName, City, State
from Person P left join Address A
on P.PersonId = A.PersonId
```

-- ##########
-- Question 37
-- Several friends at a cinema ticket office would like to reserve consecutive available seats.
-- Can you help to query all the consecutive available seats order by the seat_id using the following cinema table?
-- | seat_id | free |
-- |---------|------|
-- | 1 | 1 |
-- | 2 | 0 |
-- | 3 | 1 |
-- | 4 | 1 |
-- | 5 | 1 |

-- Your query should return the following result for the sample case above.
-- | seat_id |
-- |---------|
-- | 3 |
-- | 4 |
-- | 5 |
-- Note:
-- The seat_id is an auto increment int, and free is bool ('1' means free, and '0' means occupied.).
-- Consecutive available seats are more than 2(inclusive) seats consecutively available.

-- ======= Solution
==========

```
Select seat_id
from(
select seat_id, free,
lead(free,1) over() as next,
lag(free,1) over() as prev
from cinema) a
where a.free=True and (next = True or prev=True)
order by seat_id
```

-- ##########
-- Question 2
-- Table: Sessions
-- +---------+---------+
-- | Column Name | Type |
-- +---------+---------+

```
-- | session_id         | int     |
-- | duration           | int     |
-- +--------------------+---------+
-- session_id is the primary key for this table.
-- duration is the time in seconds that a user has visited the application.
-- You want to know how long a user visits your application. You decided to create bins of "[0-5>", "[5-10>", "[10-15>" and "15 minutes or more" and count the number of sessions on it.

-- Write an SQL query to report the (bin, total) in any order.

-- The query result format is in the following example.
-- Sessions table:
-- +-------------+---------------+
-- | session_id  | duration      |
-- +-------------+---------------+
-- | 1           | 30            |
-- | 2           | 199           |
-- | 3           | 299           |
-- | 4           | 580           |
-- | 5           | 1000          |
-- +-------------+---------------+
-- Result table:
-- +--------------+--------------+
-- | bin          | total        |
-- +--------------+--------------+
-- | [0-5>        | 3            |
-- | [5-10>       | 1            |
-- | [10-15>      | 0            |
-- | 15 or more   | 1            |
-- +--------------+--------------+

-- For session_id 1, 2 and 3 have a duration greater or equal than 0 minutes and less than 5 minutes.
-- For session_id 4 has a duration greater or equal than 5 minutes and less than 10 minutes.
-- There are no session with a duration greater or equial than 10 minutes and less than 15 minutes.
-- For session_id 5 has a duration greater or equal than 15 minutes.

-- ======= Solution
================================================================================
 2
(Select '[0-5>' as bin,
 sum(case when duration/60 < 5 then 1 else 0 end) as total from Sessions)
 union
(Select '[5-10>' as bin,
 sum(case when ((duration/60 >= 5) and (duration/60 < 10)) then 1 else 0 end) as total from Sessions)
 union
(Select '[10-15>' as bin,
 sum(case when ((duration/60 >= 10) and (duration/60 < 15)) then 1 else 0 end) as total from Sessions)
 union
(Select '15 or more' as bin,
 sum(case when duration/60 >= 15 then 1 else 0 end) as total from Sessions)
```

```
-- ######################################################################
-- Question 8
-- Query the customer_number from the orders table for the customer who has placed the largest number of orders.
-- It is guaranteed that exactly one customer will have placed more orders than any other customer.
-- The orders table is defined as follows:
-- | Column           | Type      |
-- |------------------|-----------|
-- | order_number (PK) | int       |
-- | customer_number   | int       |
-- | order_date        | date      |
-- | required_date     | date      |
-- | shipped_date      | date      |
-- | status            | char(15)  |
-- | comment           | char(200) |
-- Sample Input
-- | order_number | customer_number | order_date | required_date | shipped_date | status | comment |
-- |--------------|-----------------|------------|---------------|--------------|--------|---------|
-- | 1            | 1               | 2017-04-09 | 2017-04-13    | 2017-04-12   | Closed |         |
-- | 2            | 2               | 2017-04-15 | 2017-04-20    | 2017-04-18   | Closed |         |
-- | 3            | 3               | 2017-04-16 | 2017-04-25    | 2017-04-20   | Closed |         |
-- | 4            | 3               | 2017-04-18 | 2017-04-28    | 2017-04-25   | Closed |         |
-- Sample Output
-- | customer_number |
-- |-----------------|
-- | 3               |
-- Explanation
-- The customer with number '3' has two orders,
-- which is greater than either customer '1' or '2' because each of them  only has one order.
-- So the result is customer_number '3'.

-- ======= Solution
================================================================================

-- Ranking them according to the number of orders to have same rank for
-- customers with same number of orders
With t1 as
(
  Select customer_number,
  Rank() over(order by count(customer_number) desc) as rk
  from orders
  group by customer_number
)

Select t1.customer_number
from t1
where t1.rk=1



-- ######################################################################
-- Question 13
-- Suppose that a website contains two tables,
```

-- the Customers table and the Orders table. Write a SQL query to find all customers who never order anything.
-- Table: Customers.
-- +----+-------+
-- | Id | Name  |
-- +----+-------+
-- | 1  | Joe   |
-- | 2  | Henry |
-- | 3  | Sam   |
-- | 4  | Max   |
-- +----+-------+
-- Table: Orders.
-- +----+------------+
-- | Id | CustomerId |
-- +----+------------+
-- | 1  | 3          |
-- | 2  | 1          |
-- +----+------------+
-- Using the above tables as example, return the following:
-- +-----------+
-- | Customers |
-- +-----------+
-- | Henry     |
-- | Max       |
-- +-----------+

-- ======= Solution
================================================================================

```
Select Name as Customers
from Customers
where id != All(select c.id
            from Customers c, Orders o
            where c.id = o.Customerid)
```

-- ######################################################################
-- Question 32
-- Write a SQL query to delete all duplicate email entries in a table named Person, keeping only unique emails based on its smallest Id.
-- +----+------------------+
-- | Id | Email            |
-- +----+------------------+
-- | 1  | john@example.com |
-- | 2  | bob@example.com  |
-- | 3  | john@example.com |
-- +----+------------------+
-- Id is the primary key column for this table.
-- For example, after running your query, the above Person table should have the following rows:
-- +----+------------------+
-- | Id | Email            |
-- +----+------------------+
-- | 1  | john@example.com |

```
-- | 2  | bob@example.com  |
-- +----+------------------+

-- ======= Solution
================================================================================

With t1 as
(
 Select *,
   row_number() over(partition by email order by id) as rk
   from person
)
Delete from person
where id in (Select t1.id from t1 where t1.rk>1)

 -- ######################################################################
 -- Question 11
-- Write a SQL query to find all duplicate emails in a table named Person.
-- +----+---------+
-- | Id | Email   |
-- +----+---------+
-- | 1  | a@b.com |
-- | 2  | c@d.com |
-- | 3  | a@b.com |
-- +----+---------+
-- For example, your query should return the following for the above table:
-- +---------+
-- | Email   |
-- +---------+
-- | a@b.com |
-- +---------+

-- ======= Solution
================================================================================

Select Email
from
(Select Email, count(Email)
from person
group by Email
having count(Email)>1) a

 -- ######################################################################
 -- Question 4
-- Select all employee's name and bonus whose bonus is < 1000.
-- Table:Employee
-- +-------+--------+-----------+--------+
-- | empId |  name  | supervisor| salary |
-- +-------+--------+-----------+--------+
-- |   1   | John   |  3        | 1000   |
-- |   2   | Dan    |  3        | 2000   |
```

-- |  3  | Brad  |  null  | 4000  |
-- |  4  | Thomas |  3  | 4000  |
-- +-------+--------+----------+--------+
-- empId is the primary key column for this table.
-- Table: Bonus
-- +-------+-------+
-- | empId | bonus |
-- +-------+-------+
-- | 2  | 500  |
-- | 4  | 2000  |
-- +-------+-------+
-- empId is the primary key column for this table.
-- Example ouput:
-- +-------+-------+
-- | name  | bonus |
-- +-------+-------+
-- | John  | null  |
-- | Dan  | 500  |
-- | Brad  | null  |
-- +-------+-------+

-- ======= Solution
==========

Select E.name, B.bonus
From Employee E left join Bonus B
on E.empId = B.empId
where B.bonus< 1000 or B.Bonus IS NULL

-- ##########################################################################
-- Question 15
-- The Employee table holds all employees including their managers.
-- Every employee has an Id, and there is also a column for the manager Id.
-- +----+-------+--------+-----------+
-- | Id | Name  | Salary | ManagerId |
-- +----+-------+--------+-----------+
-- | 1  | Joe  | 70000  | 3  |
-- | 2  | Henry | 80000  | 4  |
-- | 3  | Sam  | 60000  | NULL  |
-- | 4  | Max  | 90000  | NULL  |
-- +----+-------+--------+-----------+
-- Given the Employee table, write a SQL query that finds out employees who earn more than their managers.
-- For the above table, Joe is the only employee who earns more than his manager.
-- +----------+
-- | Employee |
-- +----------+
-- | Joe  |
-- +----------+

-- ======= Solution
==========

```
select a.Name as Employee
from employee a, employee b
where a.salary>b.salary and a.managerid=b.id

 -- ##########################################################################
 -- Question 10
-- Given a table customer holding customers information and the referee.

-- +------+------+-----------+
-- | id   | name | referee_id|
-- +------+------+-----------+
-- |    1 | Will |      NULL |
-- |    2 | Jane |      NULL |
-- |    3 | Alex |         2 |
-- |    4 | Bill |      NULL |
-- |    5 | Zack |         1 |
-- |    6 | Mark |         2 |
-- +------+------+-----------+
-- Write a query to return the list of customers NOT referred by the person with id '2'.

-- For the sample data above, the result is:
-- +------+
-- | name |
-- +------+
-- | Will |
-- | Jane |
-- | Bill |
-- | Zack |
-- +------+

-- ======= Solution
================================================================================

Select name
from customer
where referee_id != 2
or referee_id is NULL

 -- ##########################################################################
 -- Question 47
-- Table: Employee
-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | employee_id   | int     |
-- | team_id       | int     |
-- +---------------+---------+
-- employee_id is the primary key for this table.
-- Each row of this table contains the ID of each employee and their respective team.
-- Write an SQL query to find the team size of each of the employees.
```

-- Return result table in any order.
-- The query result format is in the following example:
-- Employee Table:
-- +-------------+------------+
-- | employee_id | team_id    |
-- +-------------+------------+
-- |    1        |    8       |
-- |    2        |    8       |
-- |    3        |    8       |
-- |    4        |    7       |
-- |    5        |    9       |
-- |    6        |    9       |
-- +-------------+------------+
-- Result table:
-- +-------------+------------+
-- | employee_id | team_size  |
-- +-------------+------------+
-- |    1        |    3       |
-- |    2        |    3       |
-- |    3        |    3       |
-- |    4        |    1       |
-- |    5        |    2       |
-- |    6        |    2       |
-- +-------------+------------+
-- Employees with Id 1,2,3 are part of a team with team_id = 8.
-- Employees with Id 4 is part of a team with team_id = 7.
-- Employees with Id 5,6 are part of a team with team_id = 9.

-- ======= Solution
==========

Select employee_id, b.team_size
from employee e
join
(
Select team_id, count(team_id) as team_size
from employee
group by team_id) b
on e.team_id = b.team_id

-- ##########################################################################
-- Question 49
-- In social network like Facebook or Twitter, people send friend requests and accept others' requests as well. Now given two tables as below:
-- Table: friend_request
-- | sender_id | send_to_id |request_date|
-- |-----------|------------|------------|
-- | 1         | 2          | 2016_06-01 |
-- | 1         | 3          | 2016_06-01 |
-- | 1         | 4          | 2016_06-01 |

```
-- | 2          | 3          | 2016_06-02 |
-- | 3          | 4          | 2016-06-09 |
-- Table: request_accepted
-- | requester_id | accepter_id |accept_date |
-- |--------------|-------------|------------|
-- | 1            | 2           | 2016_06-03 |
-- | 1            | 3           | 2016-06-08 |
-- | 2            | 3           | 2016-06-08 |
-- | 3            | 4           | 2016-06-09 |
-- | 3            | 4           | 2016-06-10 |

-- Write a query to find the overall acceptance rate of requests rounded to 2 decimals, which is the number of acceptance divide the number of requests.

-- For the sample data above, your query should return the following result.
-- |accept_rate|
-- |-----------|
-- |      0.80|

-- Note:
-- The accepted requests are not necessarily from the table friend_request. In this case, you just need to simply count the total accepted requests (no matter whether they are in the original requests), and divide it by the number of requests to get the acceptance rate.
-- It is possible that a sender sends multiple requests to the same receiver, and a request could be accepted more than once. In this case, the 'duplicated' requests or acceptances are only counted once.
-- If there is no requests at all, you should return 0.00 as the accept_rate.

-- Explanation: There are 4 unique accepted requests, and there are 5 requests in total.
-- So the rate is 0.80.

-- ======= Solution
================================================================================

with t1 as
(
        select distinct sender_id, send_to_id
        from friend_request
), t2 as
(
        select distinct requester_id, accepter_id
        from request_accepted
)

Select
ifnull((
      select distinct
      round((select count(*) from t2) / ( select count(*) from t1),2) from t1,t2
   ),0) 'accept_rate'


 -- ######################################################################
```

-- Question 115
-- Write an SQL query to report the distinct titles of the kid-friendly movies streamed in June 2020.

-- Return the result table in any order.
-- The query result format is in the following example.
-- TVProgram table:
-- +--------------------+--------------+-------------+
-- | program_date       | content_id   | channel     |
-- +--------------------+--------------+-------------+
-- | 2020-06-10 08:00   | 1            | LC-Channel  |
-- | 2020-05-11 12:00   | 2            | LC-Channel  |
-- | 2020-05-12 12:00   | 3            | LC-Channel  |
-- | 2020-05-13 14:00   | 4            | Disney Ch   |
-- | 2020-06-18 14:00   | 4            | Disney Ch   |
-- | 2020-07-15 16:00   | 5            | Disney Ch   |
-- +--------------------+--------------+-------------+
-- Content table:
-- +------------+----------------+---------------+---------------+
-- | content_id | title          | Kids_content  | content_type  |
-- +------------+----------------+---------------+---------------+
-- | 1          | Leetcode Movie | N             | Movies        |
-- | 2          | Alg. for Kids  | Y             | Series        |
-- | 3          | Database Sols  | N             | Series        |
-- | 4          | Aladdin        | Y             | Movies        |
-- | 5          | Cinderella     | Y             | Movies        |
-- +------------+----------------+---------------+---------------+
-- Result table:
-- +--------------+
-- | title        |
-- +--------------+
-- | Aladdin      |
-- +--------------+
-- "Leetcode Movie" is not a content for kids.
-- "Alg. for Kids" is not a movie.
-- "Database Sols" is not a movie
-- "Alladin" is a movie, content for kids and was streamed in June 2020.
-- "Cinderella" was not streamed in June 2020.

-- ======= Solution
==========

```
select distinct title
from
(select content_id, title
from content
where kids_content = 'Y' and content_type = 'Movies') a
join
tvprogram using (content_id)
where month(program_date) = 6
```

-- ##########

-- Question 3
-- Table: Activity
-- +--------------+---------+
-- | Column Name  | Type    |
-- +--------------+---------+
-- | player_id    | int     |
-- | device_id    | int     |
-- | event_date   | date    |
-- | games_played | int     |
-- +--------------+---------+
-- (player_id, event_date) is the primary key of this table.
-- This table shows the activity of players of some game.
-- Each row is a record of a player who logged in and played a number of games (possibly 0) before logging out on some day using some device.

-- Write an SQL query that reports the first login date for each player.
-- The query result format is in the following example:
-- Activity table:
-- +-----------+-----------+------------+--------------+
-- | player_id | device_id | event_date | games_played |
-- +-----------+-----------+------------+--------------+
-- | 1         | 2         | 2016-03-01 | 5            |
-- | 1         | 2         | 2016-05-02 | 6            |
-- | 2         | 3         | 2017-06-25 | 1            |
-- | 3         | 1         | 2016-03-02 | 0            |
-- | 3         | 4         | 2018-07-03 | 5            |
-- +-----------+-----------+------------+--------------+
-- Result table:
-- +-----------+-------------+
-- | player_id | first_login |
-- +-----------+-------------+
-- | 1         | 2016-03-01  |
-- | 2         | 2017-06-25  |
-- | 3         | 2016-03-02  |
-- +-----------+-------------+

-- ======= Solution
================================================================================

Select player_id, min(event_date) as first_login
from Activity
Group by player_id

-- ##########################################################################
-- Question 9
-- Table: Activity

-- +--------------+---------+
-- | Column Name  | Type    |
-- +--------------+---------+
-- | player_id    | int     |

-- | device_id    | int     |
-- | event_date   | date    |
-- | games_played | int     |
-- +--------------+---------+
-- (player_id, event_date) is the primary key of this table.
-- This table shows the activity of players of some game.
-- Each row is a record of a player who logged in and played a number of games (possibly 0) before logging out on some day using some device.

-- Write a SQL query that reports the device that is first logged in for each player.

-- The query result format is in the following example:
-- Activity table:
-- +-----------+-----------+------------+--------------+
-- | player_id | device_id | event_date | games_played |
-- +-----------+-----------+------------+--------------+
-- | 1         | 2         | 2016-03-01 | 5            |
-- | 1         | 2         | 2016-05-02 | 6            |
-- | 2         | 3         | 2017-06-25 | 1            |
-- | 3         | 1         | 2016-03-02 | 0            |
-- | 3         | 4         | 2018-07-03 | 5            |
-- +-----------+-----------+------------+--------------+
-- Result table:
-- +-----------+-----------+
-- | player_id | device_id |
-- +-----------+-----------+
-- | 1         | 2         |
-- | 2         | 3         |
-- | 3         | 1         |
-- +-----------+-----------+

-- ======= Solution
==========

```
With table1 as
(
  Select player_id, device_id,
  Rank() OVER(partition by player_id
          order by event_date) as rk
  From Activity
)
Select t.player_id, t.device_id
from table1 as t
where t.rk=1
```

-- ##########################################################################
-- Question 116
-- Table Activities:
-- +--------------+---------+
-- | Column Name  | Type    |
-- +--------------+---------+

-- | sell_date   | date    |
-- | product     | varchar |
-- +-------------+---------+
-- There is no primary key for this table, it may contains duplicates.
-- Each row of this table contains the product name and the date it was sold in a market.

-- Write an SQL query to find for each date, the number of distinct products sold and their names.

-- The sold-products names for each date should be sorted lexicographically.
-- Return the result table ordered by sell_date.
-- The query result format is in the following example.
-- Activities table:
-- +------------+-------------+
-- | sell_date  | product     |
-- +------------+-------------+
-- | 2020-05-30 | Headphone   |
-- | 2020-06-01 | Pencil      |
-- | 2020-06-02 | Mask        |
-- | 2020-05-30 | Basketball  |
-- | 2020-06-01 | Bible       |
-- | 2020-06-02 | Mask        |
-- | 2020-05-30 | T-Shirt     |
-- +------------+-------------+
-- Result table:
-- +------------+----------+------------------------------+
-- | sell_date  | num_sold | products                     |
-- +------------+----------+------------------------------+
-- | 2020-05-30 | 3        | Basketball,Headphone,T-shirt |
-- | 2020-06-01 | 2        | Bible,Pencil                 |
-- | 2020-06-02 | 1        | Mask                         |
-- +------------+----------+------------------------------+
-- For 2020-05-30, Sold items were (Headphone, Basketball, T-shirt), we sort them lexicographically and separate them by comma.
-- For 2020-06-01, Sold items were (Pencil, Bible), we sort them lexicographically and separate them by comma.
-- For 2020-06-02, Sold item is (Mask), we just return it.

-- ======= Solution
================================================================================

select sell_date, count(distinct product) as num_sold, group_concat(distinct product) as products
from activities
group by 1
order by 1

 -- ######################################################################
 -- Question 38
-- Table: Delivery
-- +-----------------------------+---------+
-- | Column Name                 | Type    |
-- +-----------------------------+---------+
-- | delivery_id                 | int     |

-- | customer_id | int |
-- | order_date | date |
-- | customer_pref_delivery_date | date |
-- +-----------------------------+---------+
-- delivery_id is the primary key of this table.
-- The table holds information about food delivery to customers that make orders at some date and specify a preferred delivery date (on the same order date or after it).

-- If the preferred delivery date of the customer is the same as the order date then the order is called immediate otherwise it's called scheduled.

-- Write an SQL query to find the percentage of immediate orders in the table, rounded to 2 decimal places.

-- The query result format is in the following example:
-- Delivery table:
-- +-------------+-------------+------------+----------------------------+
-- | delivery_id | customer_id | order_date | customer_pref_delivery_date |
-- +-------------+-------------+------------+----------------------------+
-- | 1 | 1 | 2019-08-01 | 2019-08-02 |
-- | 2 | 5 | 2019-08-02 | 2019-08-02 |
-- | 3 | 1 | 2019-08-11 | 2019-08-11 |
-- | 4 | 3 | 2019-08-24 | 2019-08-26 |
-- | 5 | 4 | 2019-08-21 | 2019-08-22 |
-- | 6 | 2 | 2019-08-11 | 2019-08-13 |
-- +-------------+-------------+------------+----------------------------+
-- Result table:
-- +----------------------+
-- | immediate_percentage |
-- +----------------------+
-- | 33.33 |
-- +----------------------+
-- The orders with delivery id 2 and 3 are immediate while the others are scheduled.

-- ======= Solution
==========

Select
Round(avg(case when order_date=customer_pref_delivery_date then 1 else 0 end)*100,2) as immediate_percentage from delivery

-- ##########################################################################
-- Question 45
-- Table: Products
-- +------------------+---------+
-- | Column Name | Type |
-- +------------------+---------+
-- | product_id | int |
-- | product_name | varchar |
-- | product_category | varchar |
-- +------------------+---------+
-- product_id is the primary key for this table.

-- This table contains data about the company's products.
-- Table: Orders
-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | product_id    | int     |
-- | order_date    | date    |
-- | unit          | int     |
-- +---------------+---------+
-- There is no primary key for this table. It may have duplicate rows.
-- product_id is a foreign key to Products table.
-- unit is the number of products ordered in order_date.

-- Write an SQL query to get the names of products with greater than or equal to 100 units ordered in February 2020 and their amount.
-- Return result table in any order.
-- The query result format is in the following example:
-- Products table:
-- +-------------+-----------------------+------------------+
-- | product_id  | product_name          | product_category |
-- +-------------+-----------------------+------------------+
-- | 1           | Leetcode Solutions    | Book             |
-- | 2           | Jewels of Stringology | Book             |
-- | 3           | HP                    | Laptop           |
-- | 4           | Lenovo                | Laptop           |
-- | 5           | Leetcode Kit          | T-shirt          |
-- +-------------+-----------------------+------------------+
-- Orders table:
-- +--------------+--------------+----------+
-- | product_id   | order_date   | unit     |
-- +--------------+--------------+----------+
-- | 1            | 2020-02-05   | 60       |
-- | 1            | 2020-02-10   | 70       |
-- | 2            | 2020-01-18   | 30       |
-- | 2            | 2020-02-11   | 80       |
-- | 3            | 2020-02-17   | 2        |
-- | 3            | 2020-02-24   | 3        |
-- | 4            | 2020-03-01   | 20       |
-- | 4            | 2020-03-04   | 30       |
-- | 4            | 2020-03-04   | 60       |
-- | 5            | 2020-02-25   | 50       |
-- | 5            | 2020-02-27   | 50       |
-- | 5            | 2020-03-01   | 50       |
-- +--------------+--------------+----------+
-- Result table:
-- +--------------------+---------+
-- | product_name       | unit    |
-- +--------------------+---------+
-- | Leetcode Solutions | 130     |
-- | Leetcode Kit       | 100     |
-- +--------------------+---------+

-- Products with product_id = 1 is ordered in February a total of (60 + 70) = 130.
-- Products with product_id = 2 is ordered in February a total of 80.
-- Products with product_id = 3 is ordered in February a total of (2 + 3) = 5.
-- Products with product_id = 4 was not ordered in February 2020.
-- Products with product_id = 5 is ordered in February a total of (50 + 50) = 100.

-- ======= Solution
==========

```
Select a.product_name, a.unit
from
(select p.product_name, sum(unit) as unit
from orders o
join products p
on o.product_id = p.product_id
where month(order_date)=2 and year(order_date) = 2020
group by o.product_id) a
where a.unit>=100
```

-- ##########
-- Question 6
-- X city opened a new cinema, many people would like to go to this cinema.
-- The cinema also gives out a poster indicating the movies' ratings and descriptions.
-- Please write a SQL query to output movies with an odd numbered ID and a description that is not 'boring'.
-- Order the result by rating.
-- For example, table cinema:
-- +---------+-----------+--------------+-----------+
-- | id | movie | description | rating |
-- +---------+-----------+--------------+-----------+
-- | 1 | War | great 3D | 8.9 |
-- | 2 | Science | fiction | 8.5 |
-- | 3 | irish | boring | 6.2 |
-- | 4 | Ice song | Fantacy | 8.6 |
-- | 5 | House card| Interesting| 9.1 |
-- +---------+-----------+--------------+-----------+
-- For the example above, the output should be:
-- +---------+-----------+--------------+-----------+
-- | id | movie | description | rating |
-- +---------+-----------+--------------+-----------+
-- | 5 | House card| Interesting| 9.1 |
-- | 1 | War | great 3D | 8.9 |
-- +---------+-----------+--------------+-----------+

-- ======= Solution
==========

```
Select *
from cinema
where id%2=1 and description not in ('boring')
order by rating desc
```

```
-- ##########################################################################
-- Question 31
-- Table: Submissions
-- +---------------+----------+
-- | Column Name   | Type     |
-- +---------------+----------+
-- | sub_id        | int      |
-- | parent_id     | int      |
-- +---------------+----------+
-- There is no primary key for this table, it may have duplicate rows.
-- Each row can be a post or comment on the post.
-- parent_id is null for posts.
-- parent_id for comments is sub_id for another post in the table.

-- Write an SQL query to find number of comments per each post.

-- Result table should contain post_id and its corresponding number_of_comments,
-- and must be sorted by post_id in ascending order.
-- Submissions may contain duplicate comments. You should count the number of unique comments per post.
-- Submissions may contain duplicate posts. You should treat them as one post.
-- The query result format is in the following example:
-- Submissions table:
-- +---------+------------+
-- | sub_id  | parent_id  |
-- +---------+------------+
-- | 1       | Null       |
-- | 2       | Null       |
-- | 1       | Null       |
-- | 12      | Null       |
-- | 3       | 1          |
-- | 5       | 2          |
-- | 3       | 1          |
-- | 4       | 1          |
-- | 9       | 1          |
-- | 10      | 2          |
-- | 6       | 7          |
-- +---------+------------+
-- Result table:
-- +---------+--------------------+
-- | post_id | number_of_comments |
-- +---------+--------------------+
-- | 1       | 3                  |
-- | 2       | 2                  |
-- | 12      | 0                  |
-- +---------+--------------------+
-- The post with id 1 has three comments in the table with id 3, 4 and 9. The comment with id 3 is
-- repeated in the table, we counted it only once.
-- The post with id 2 has two comments in the table with id 5 and 10.
-- The post with id 12 has no comments in the table.
-- The comment with id 6 is a comment on a deleted post with id 7 so we ignored it.
```

-- ======= Solution
==========

Select a.sub_id as post_id, coalesce(b.number_of_comments,0) as number_of_comments
from(
select distinct sub_id from submissions where parent_id is null) a
left join(
select parent_id, count(distinct(sub_id)) as number_of_comments
from submissions
group by parent_id
having parent_id = any(select sub_id from submissions where parent_id is null)) b
on a.sub_id = b.parent_id
order by post_id

-- ##########################################################################
-- Question 30
-- Table: Sales
-- +-------------+-------+
-- | Column Name | Type  |
-- +-------------+-------+
-- | sale_id     | int   |
-- | product_id  | int   |
-- | year        | int   |
-- | quantity    | int   |
-- | price       | int   |
-- +-------------+-------+
-- (sale_id, year) is the primary key of this table.
-- product_id is a foreign key to Product table.
-- Note that the price is per unit.
-- Table: Product
-- +--------------+---------+
-- | Column Name  | Type    |
-- +--------------+---------+
-- | product_id   | int     |
-- | product_name | varchar |
-- +--------------+---------+
-- product_id is the primary key of this table.

-- Write an SQL query that reports all product names of the products in the Sales table along with their selling year and price.

-- For example:
-- Sales table:
-- +---------+------------+------+----------+-------+
-- | sale_id | product_id | year | quantity | price |
-- +---------+------------+------+----------+-------+
-- | 1       | 100        | 2008 | 10       | 5000  |
-- | 2       | 100        | 2009 | 12       | 5000  |
-- | 7       | 200        | 2011 | 15       | 9000  |
-- +---------+------------+------+----------+-------+

```
-- Product table:
-- +------------+--------------+
-- | product_id | product_name |
-- +------------+--------------+
-- | 100        | Nokia        |
-- | 200        | Apple        |
-- | 300        | Samsung      |
-- +------------+--------------+
-- Result table:
-- +--------------+-------+-------+
-- | product_name | year  | price |
-- +--------------+-------+-------+
-- | Nokia        | 2008  | 5000  |
-- | Nokia        | 2009  | 5000  |
-- | Apple        | 2011  | 9000  |
-- +--------------+-------+-------+

-- ======= Solution
================================================================================

Select a.product_name, b.year, b.price
from product as a
join
sales as b
on a.product_id = b.product_id

 -- ##########################################################################
 -- Question 29
-- Table: Sales
-- +-------------+-------+
-- | Column Name | Type  |
-- +-------------+-------+
-- | sale_id     | int   |
-- | product_id  | int   |
-- | year        | int   |
-- | quantity    | int   |
-- | price       | int   |
-- +-------------+-------+
-- sale_id is the primary key of this table.
-- product_id is a foreign key to Product table.
-- Note that the price is per unit.
-- Table: Product
-- +--------------+---------+
-- | Column Name  | Type    |
-- +--------------+---------+
-- | product_id   | int     |
-- | product_name | varchar |
-- +--------------+---------+
-- product_id is the primary key of this table.

-- Write an SQL query that reports the total quantity sold for every product id.
```

```
-- The query result format is in the following example:
-- Sales table:
-- +---------+------------+------+----------+-------+
-- | sale_id | product_id | year | quantity | price |
-- +---------+------------+------+----------+-------+
-- | 1       | 100        | 2008 | 10       | 5000  |
-- | 2       | 100        | 2009 | 12       | 5000  |
-- | 7       | 200        | 2011 | 15       | 9000  |
-- +---------+------------+------+----------+-------+
-- Product table:
-- +------------+--------------+
-- | product_id | product_name |
-- +------------+--------------+
-- | 100        | Nokia        |
-- | 200        | Apple        |
-- | 300        | Samsung      |
-- +------------+--------------+
-- Result table:
-- +--------------+----------------+
-- | product_id   | total_quantity |
-- +--------------+----------------+
-- | 100          | 22             |
-- | 200          | 15             |
-- +--------------+----------------+

-- ======= Solution
================================================================================

Select a.product_id, sum(a.quantity) as total_quantity
from sales a
join
product b
on a.product_id = b.product_id
group by a.product_id

 -- ########################################################################
 -- Question 26
-- Table: Project
-- +-------------+---------+
-- | Column Name | Type    |
-- +-------------+---------+
-- | project_id  | int     |
-- | employee_id | int     |
-- +-------------+---------+
-- (project_id, employee_id) is the primary key of this table.
-- employee_id is a foreign key to Employee table.
-- Table: Employee
-- +------------------+---------+
-- | Column Name      | Type    |
-- +------------------+---------+
-- | employee_id      | int     |
```

```
-- | name           | varchar |
-- | experience_years | int     |
-- +------------------+---------+
-- employee_id is the primary key of this table.

-- Write an SQL query that reports the average experience years of all the employees for each project, rounded to 2 digits.

-- The query result format is in the following example:
-- Project table:
-- +-------------+-------------+
-- | project_id  | employee_id |
-- +-------------+-------------+
-- | 1           | 1           |
-- | 1           | 2           |
-- | 1           | 3           |
-- | 2           | 1           |
-- | 2           | 4           |
-- +-------------+-------------+
-- Employee table:
-- +-------------+--------+------------------+
-- | employee_id | name   | experience_years |
-- +-------------+--------+------------------+
-- | 1           | Khaled | 3                |
-- | 2           | Ali    | 2                |
-- | 3           | John   | 1                |
-- | 4           | Doe    | 2                |
-- +-------------+--------+------------------+
-- Result table:
-- +-------------+---------------+
-- | project_id  | average_years |
-- +-------------+---------------+
-- | 1           | 2.00          |
-- | 2           | 2.50          |
-- +-------------+---------------+
-- The average experience years for the first project is (3 + 2 + 1) / 3 = 2.00 and for the second project is (3 + 2) / 2 = 2.50

-- ======= Solution
================================================================================

Select a.project_id, round(sum(b.experience_years)/count(b.employee_id),2) as average_years
from project as a
join
employee as b
on a.employee_id=b.employee_id
group by a.project_id

 -- ##########################################################################
 -- Question 28
-- Table: Project
-- +-------------+---------+
```

```
-- | Column Name | Type    |
-- +-------------+---------+
-- | project_id  | int     |
-- | employee_id | int     |
-- +-------------+---------+
-- (project_id, employee_id) is the primary key of this table.
-- employee_id is a foreign key to Employee table.
-- Table: Employee
-- +------------------+---------+
-- | Column Name      | Type    |
-- +------------------+---------+
-- | employee_id      | int     |
-- | name             | varchar |
-- | experience_years | int     |
-- +------------------+---------+
-- employee_id is the primary key of this table.

-- Write an SQL query that reports all the projects that have the most employees.

-- The query result format is in the following example:
-- Project table:
-- +-------------+-------------+
-- | project_id  | employee_id |
-- +-------------+-------------+
-- | 1           | 1           |
-- | 1           | 2           |
-- | 1           | 3           |
-- | 2           | 1           |
-- | 2           | 4           |
-- +-------------+-------------+
-- Employee table:
-- +-------------+--------+------------------+
-- | employee_id | name   | experience_years |
-- +-------------+--------+------------------+
-- | 1           | Khaled | 3                |
-- | 2           | Ali    | 2                |
-- | 3           | John   | 1                |
-- | 4           | Doe    | 2                |
-- +-------------+--------+------------------+
-- Result table:
-- +-------------+
-- | project_id  |
-- +-------------+
-- | 1           |
-- +-------------+
-- The first project has 3 employees while the second one has 2.

-- ======= Solution
================================================================================

select a.project_id
```

```
from(
select project_id,
rank() over(order by count(employee_id) desc) as rk
from project
group by project_id) a
where a.rk = 1

 -- ##########################################################################
 -- Question 41
-- Table: Queries

-- +-------------+---------+
-- | Column Name | Type    |
-- +-------------+---------+
-- | query_name  | varchar |
-- | result      | varchar |
-- | position    | int     |
-- | rating      | int     |
-- +-------------+---------+
-- There is no primary key for this table, it may have duplicate rows.
-- This table contains information collected from some queries on a database.
-- The position column has a value from 1 to 500.
-- The rating column has a value from 1 to 5. Query with rating less than 3 is a poor query.


-- We define query quality as:

-- The average of the ratio between query rating and its position.

-- We also define poor query percentage as:

-- The percentage of all queries with rating less than 3.

-- Write an SQL query to find each query_name, the quality and poor_query_percentage.

-- Both quality and poor_query_percentage should be rounded to 2 decimal places.

-- The query result format is in the following example:

-- Queries table:
-- +------------+-------------------+----------+--------+
-- | query_name | result            | position | rating |
-- +------------+-------------------+----------+--------+
-- | Dog        | Golden Retriever  | 1        | 5      |
-- | Dog        | German Shepherd   | 2        | 5      |
-- | Dog        | Mule              | 200      | 1      |
-- | Cat        | Shirazi           | 5        | 2      |
-- | Cat        | Siamese           | 3        | 3      |
-- | Cat        | Sphynx            | 7        | 4      |
-- +------------+-------------------+----------+--------+
```

-- Result table:
-- +------------+---------+----------------------+
-- | query_name | quality | poor_query_percentage |
-- +------------+---------+----------------------+
-- | Dog        | 2.50    | 33.33                |
-- | Cat        | 0.66    | 33.33                |
-- +------------+---------+----------------------+

-- Dog queries quality is ((5 / 1) + (5 / 2) + (1 / 200)) / 3 = 2.50
-- Dog queries poor_ query_percentage is (1 / 3) * 100 = 33.33

-- Cat queries quality equals ((2 / 5) + (3 / 3) + (4 / 7)) / 3 = 0.66
-- Cat queries poor_ query_percentage is (1 / 3) * 100 = 33.33

-- ======= Solution
==========

Select query_name, round(sum(rating/position)/count(*),2) as quality,
round(avg(case when rating<3 then 1 else 0 end)*100,2) as poor_query_percentage
from queries
group by query_name

-- ##########################################################################
-- Question 44
-- Table: Department

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | id            | int     |
-- | revenue       | int     |
-- | month         | varchar |
-- +---------------+---------+
-- (id, month) is the primary key of this table.
-- The table has information about the revenue of each department per month.
-- The month has values in ["Jan","Feb","Mar","Apr","May","Jun","Jul","Aug","Sep","Oct","Nov","Dec"].

-- Write an SQL query to reformat the table such that there is a department id column and a revenue column for each month.

-- The query result format is in the following example:

-- Department table:
-- +------+---------+-------+
-- | id   | revenue | month |
-- +------+---------+-------+
-- | 1    | 8000    | Jan   |
-- | 2    | 9000    | Jan   |
-- | 3    | 10000   | Feb   |
-- | 1    | 7000    | Feb   |

```
-- | 1    | 6000    | Mar   |
-- +------+---------+-------+

-- Result table:
-- +------+-------------+-------------+-------------+-----+-------------+
-- | id   | Jan_Revenue | Feb_Revenue | Mar_Revenue | ... | Dec_Revenue |
-- +------+-------------+-------------+-------------+-----+-------------+
-- | 1    | 8000        | 7000        | 6000        | ... | null        |
-- | 2    | 9000        | null        | null        | ... | null        |
-- | 3    | null        | 10000       | null        | ... | null        |
-- +------+-------------+-------------+-------------+-----+-------------+

-- Note that the result table has 13 columns (1 for the department id + 12 for the months).

-- ======= Solution
================================================================================

select id,
sum(if(month='Jan',revenue,null)) as Jan_Revenue,
sum(if(month='Feb',revenue,null)) as Feb_Revenue,
sum(if(month='Mar',revenue,null)) as Mar_Revenue,
sum(if(month='Apr',revenue,null)) as Apr_Revenue,
sum(if(month='May',revenue,null)) as May_Revenue,
sum(if(month='Jun',revenue,null)) as Jun_Revenue,
sum(if(month='Jul',revenue,null)) as Jul_Revenue,
sum(if(month='Aug',revenue,null)) as Aug_Revenue,
sum(if(month='Sep',revenue,null)) as Sep_Revenue,
sum(if(month='Oct',revenue,null)) as Oct_Revenue,
sum(if(month='Nov',revenue,null)) as Nov_Revenue,
sum(if(month='Dec',revenue,null)) as Dec_Revenue
from Department
group by id

 -- ##########################################################################
 -- Question 48
-- Table: Employees

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | id            | int     |
-- | name          | varchar |
-- +---------------+---------+
-- id is the primary key for this table.
-- Each row of this table contains the id and the name of an employee in a company.



-- Table: EmployeeUNI

-- +---------------+---------+
-- | Column Name   | Type    |
```

```
-- +---------------+---------+
-- | id            | int     |
-- | unique_id     | int     |
-- +---------------+---------+
-- (id, unique_id) is the primary key for this table.
-- Each row of this table contains the id and the corresponding unique id of an employee in the company.


-- Write an SQL query to show the unique ID of each user, If a user doesn't have a unique ID replace just show null.

-- Return the result table in any order.

-- The query result format is in the following example:

-- Employees table:
-- +----+----------+
-- | id | name     |
-- +----+----------+
-- | 1  | Alice    |
-- | 7  | Bob      |
-- | 11 | Meir     |
-- | 90 | Winston  |
-- | 3  | Jonathan |
-- +----+----------+

-- EmployeeUNI table:
-- +----+-----------+
-- | id | unique_id |
-- +----+-----------+
-- | 3  | 1         |
-- | 11 | 2         |
-- | 90 | 3         |
-- +----+-----------+

-- EmployeeUNI table:
-- +-----------+----------+
-- | unique_id | name     |
-- +-----------+----------+
-- | null      | Alice    |
-- | null      | Bob      |
-- | 2         | Meir     |
-- | 3         | Winston  |
-- | 1         | Jonathan |
-- +-----------+----------+

-- Alice and Bob don't have a unique ID, We will show null instead.
-- The unique ID of Meir is 2.
-- The unique ID of Winston is 3.
-- The unique ID of Jonathan is 1.
```

-- ======= Solution
==========

```
select unique_id, name
from employees e
left join
employeeuni u
on e.id = u.id
order by e.id
```

-- ##########################################################################
-- Question 43
-- Table: Actions

```
-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | user_id       | int     |
-- | post_id       | int     |
-- | action_date   | date    |
-- | action        | enum    |
-- | extra         | varchar |
-- +---------------+---------+
```

-- There is no primary key for this table, it may have duplicate rows.
-- The action column is an ENUM type of ('view', 'like', 'reaction', 'comment', 'report', 'share').
-- The extra column has optional information about the action such as a reason for report or a type of reaction.

-- Write an SQL query that reports the number of posts reported yesterday for each report reason. Assume today is 2019-07-05.

-- The query result format is in the following example:

-- Actions table:

```
-- +---------+---------+-------------+--------+--------+
-- | user_id | post_id | action_date | action | extra  |
-- +---------+---------+-------------+--------+--------+
-- | 1       | 1       | 2019-07-01  | view   | null   |
-- | 1       | 1       | 2019-07-01  | like   | null   |
-- | 1       | 1       | 2019-07-01  | share  | null   |
-- | 2       | 4       | 2019-07-04  | view   | null   |
-- | 2       | 4       | 2019-07-04  | report | spam   |
-- | 3       | 4       | 2019-07-04  | view   | null   |
-- | 3       | 4       | 2019-07-04  | report | spam   |
-- | 4       | 3       | 2019-07-02  | view   | null   |
-- | 4       | 3       | 2019-07-02  | report | spam   |
-- | 5       | 2       | 2019-07-04  | view   | null   |
-- | 5       | 2       | 2019-07-04  | report | racism |
-- | 5       | 5       | 2019-07-04  | view   | null   |
-- | 5       | 5       | 2019-07-04  | report | racism |
-- +---------+---------+-------------+--------+--------+
```

-- Result table:
-- +---------------+--------------+
-- | report_reason | report_count |
-- +---------------+--------------+
-- | spam          | 1            |
-- | racism        | 2            |
-- +---------------+--------------+
-- Note that we only care about report reasons with non zero number of reports.

-- ======= Solution
==========

Select extra as report_reason, count(distinct post_id) as report_count
from actions
where action_date = DATE_SUB("2019-07-5", INTERVAL 1 DAY) and action='report'
group by extra

-- ######################################################################
-- Question 12
-- Given a Weather table, write a SQL query to find all dates' Ids with higher temperature compared to its previous (yesterday's) dates.

-- +---------+------------------+------------------+
-- | Id(INT) | RecordDate(DATE) | Temperature(INT) |
-- +---------+------------------+------------------+
-- |       1 |       2015-01-01 |               10 |
-- |       2 |       2015-01-02 |               25 |
-- |       3 |       2015-01-03 |               20 |
-- |       4 |       2015-01-04 |               30 |
-- +---------+------------------+------------------+
-- For example, return the following Ids for the above Weather table:

-- +----+
-- | Id |
-- +----+
-- |  2 |
-- |  4 |
-- +----+

-- ======= Solution
==========

select a.Id
from weather a, weather b
where a.Temperature>b.Temperature and  datediff(a.recorddate,b.recorddate)=1

-- ######################################################################
-- Question 27
-- Table: Product

```
-- +--------------+---------+
-- | Column Name  | Type    |
-- +--------------+---------+
-- | product_id   | int     |
-- | product_name | varchar |
-- | unit_price   | int     |
-- +--------------+---------+
-- product_id is the primary key of this table.
-- Table: Sales

-- +-------------+---------+
-- | Column Name | Type    |
-- +-------------+---------+
-- | seller_id   | int     |
-- | product_id  | int     |
-- | buyer_id    | int     |
-- | sale_date   | date    |
-- | quantity    | int     |
-- | price       | int     |
-- +------ ------+---------+
-- This table has no primary key, it can have repeated rows.
-- product_id is a foreign key to Product table.


-- Write an SQL query that reports the best seller by total sales price, If there is a tie, report them all.

-- The query result format is in the following example:

-- Product table:
-- +------------+--------------+------------+
-- | product_id | product_name | unit_price |
-- +------------+--------------+------------+
-- | 1          | S8           | 1000       |
-- | 2          | G4           | 800        |
-- | 3          | iPhone       | 1400       |
-- +------------+--------------+------------+

-- Sales table:
-- +-----------+------------+----------+------------+----------+-------+
-- | seller_id | product_id | buyer_id | sale_date  | quantity | price |
-- +-----------+------------+----------+------------+----------+-------+
-- | 1         | 1          | 1        | 2019-01-21 | 2        | 2000  |
-- | 1         | 2          | 2        | 2019-02-17 | 1        | 800   |
-- | 2         | 2          | 3        | 2019-06-02 | 1        | 800   |
-- | 3         | 3          | 4        | 2019-05-13 | 2        | 2800  |
-- +-----------+------------+----------+------------+----------+-------+

-- Result table:
-- +-------------+
-- | seller_id   |
-- +-------------+
```

-- | 1 |
-- | 3 |
-- +----------+
-- Both sellers with id 1 and 3 sold products with the most total price of 2800.

-- ======= Solution
==========

```
Select a.seller_id
from
(select seller_id,
rank() over(order by sum(price) desc) as rk
from sales
group by seller_id) a
where a.rk=1
```

-- ##########
-- Question 33
-- Table: Product

-- +----------+---------+
-- | Column Name | Type |
-- +----------+---------+
-- | product_id | int |
-- | product_name | varchar |
-- | unit_price | int |
-- +----------+---------+
-- product_id is the primary key of this table.
-- Table: Sales

-- +----------+---------+
-- | Column Name | Type |
-- +----------+---------+
-- | seller_id | int |
-- | product_id | int |
-- | buyer_id | int |
-- | sale_date | date |
-- | quantity | int |
-- | price | int |
-- +------ ------+---------+
-- This table has no primary key, it can have repeated rows.
-- product_id is a foreign key to Product table.

-- Write an SQL query that reports the buyers who have bought S8 but not iPhone. Note that S8 and iPhone are products present in the Product table.

-- The query result format is in the following example:

-- Product table:
-- +----------+----------+----------+

```
-- | product_id | product_name | unit_price |
-- +------------+--------------+------------+
-- | 1          | S8           | 1000       |
-- | 2          | G4           | 800        |
-- | 3          | iPhone       | 1400       |
-- +------------+--------------+------------+

-- Sales table:
-- +-----------+------------+----------+------------+----------+-------+
-- | seller_id | product_id | buyer_id | sale_date  | quantity | price |
-- +-----------+------------+----------+------------+----------+-------+
-- | 1         | 1          | 1        | 2019-01-21 | 2        | 2000  |
-- | 1         | 2          | 2        | 2019-02-17 | 1        | 800   |
-- | 2         | 1          | 3        | 2019-06-02 | 1        | 800   |
-- | 3         | 3          | 3        | 2019-05-13 | 2        | 2800  |
-- +-----------+------------+----------+------------+----------+-------+

-- Result table:
-- +-------------+
-- | buyer_id    |
-- +-------------+
-- | 1           |
-- +-------------+
-- The buyer with id 1 bought an S8 but didn't buy an iPhone. The buyer with id 3 bought both.

-- ======= Solution
================================================================================

Select distinct a.buyer_id
from sales a join
product b
on a.product_id = b.product_id
where a.buyer_id in
(Select a.buyer_id from sales a join product b on a.product_id = b.product_id where b.product_name = 'S8')
and
a.buyer_id not in (Select a.buyer_id from sales a join product b on a.product_id = b.product_id where b.product_name =
'iPhone')

 -- ##########################################################################
 -- Question 34
-- Table: Product

-- +--------------+---------+
-- | Column Name  | Type    |
-- +--------------+---------+
-- | product_id   | int     |
-- | product_name | varchar |
-- | unit_price   | int     |
-- +--------------+---------+
-- product_id is the primary key of this table.
-- Table: Sales
```

```
-- +-------------+---------+
-- | Column Name | Type    |
-- +-------------+---------+
-- | seller_id   | int     |
-- | product_id  | int     |
-- | buyer_id    | int     |
-- | sale_date   | date    |
-- | quantity    | int     |
-- | price       | int     |
-- +------ ------+---------+
-- This table has no primary key, it can have repeated rows.
-- product_id is a foreign key to Product table.


-- Write an SQL query that reports the products that were only sold in spring 2019. That is, between 2019-01-01 and 2019-03-31 inclusive.

-- The query result format is in the following example:

-- Product table:
-- +------------+--------------+------------+
-- | product_id | product_name | unit_price |
-- +------------+--------------+------------+
-- | 1          | S8           | 1000       |
-- | 2          | G4           | 800        |
-- | 3          | iPhone       | 1400       |
-- +------------+--------------+------------+

-- Sales table:
-- +-----------+------------+----------+------------+----------+-------+
-- | seller_id | product_id | buyer_id | sale_date  | quantity | price |
-- +-----------+------------+----------+------------+----------+-------+
-- | 1         | 1          | 1        | 2019-01-21 | 2        | 2000  |
-- | 1         | 2          | 2        | 2019-02-17 | 1        | 800   |
-- | 2         | 2          | 3        | 2019-06-02 | 1        | 800   |
-- | 3         | 3          | 4        | 2019-05-13 | 2        | 2800  |
-- +-----------+------------+----------+------------+----------+-------+

-- Result table:
-- +-------------+--------------+
-- | product_id  | product_name |
-- +-------------+--------------+
-- | 1           | S8           |
-- +-------------+--------------+
-- The product with id 1 was only sold in spring 2019 while the other two were sold after.

-- ======= Solution
================================================================================
```

```
select distinct a.product_id, product_name from sales a join product b on a.product_id = b.product_id where
a.product_id
in
(select product_id from sales where sale_date >= '2019-01-01' and sale_date <= '2019-03-31')
and
a.product_id not in
(select product_id from sales where sale_date > '2019-03-31' or sale_date < '2019-01-01')

 -- ######################################################################
 -- Question 12
-- Description

-- Given three tables: salesperson, company, orders.
-- Output all the names in the table salesperson, who didn't have sales to company 'RED'.

-- Example
-- Input

-- Table: salesperson

-- +----------+------+--------+-----------------+-----------+
-- | sales_id | name | salary | commission_rate | hire_date |
-- +----------+------+--------+-----------------+-----------+
-- |   1      | John | 100000 |     6           | 4/1/2006  |
-- |   2      | Amy  | 120000 |     5           | 5/1/2010  |
-- |   3      | Mark | 65000  |     12          | 12/25/2008|
-- |   4      | Pam  | 25000  |     25          | 1/1/2005  |
-- |   5      | Alex | 50000  |     10          | 2/3/2007  |
-- +----------+------+--------+-----------------+-----------+
-- The table salesperson holds the salesperson information. Every salesperson has a sales_id and a name.
-- Table: company

-- +---------+--------+------------+
-- | com_id  |  name  |    city    |
-- +---------+--------+------------+
-- |   1     |  RED   |   Boston   |
-- |   2     | ORANGE |   New York |
-- |   3     | YELLOW |   Boston   |
-- |   4     | GREEN  |   Austin   |
-- +---------+--------+------------+
-- The table company holds the company information. Every company has a com_id and a name.
-- Table: orders

-- +----------+------------+---------+----------+--------+
-- | order_id | order_date | com_id  | sales_id | amount |
-- +----------+------------+---------+----------+--------+
-- | 1        |   1/1/2014 |    3    |    4     | 100000 |
-- | 2        |   2/1/2014 |    4    |    5     | 5000   |
-- | 3        |   3/1/2014 |    1    |    1     | 50000  |
-- | 4        |   4/1/2014 |    1    |    4     | 25000  |
-- +----------+----------+---------+----------+--------+
```

-- The table orders holds the sales record information, salesperson and customer company are represented by sales_id and com_id.
-- output

-- +------+
-- | name |
-- +------+
-- | Amy  |
-- | Mark |
-- | Alex |
-- +------+
-- Explanation

-- According to order '3' and '4' in table orders, it is easy to tell only salesperson 'John' and 'Pam' have sales to company 'RED',
-- so we need to output all the other names in the table salesperson.

-- ======= Solution
==========

# Takes higher time
# Select distinct a.name
# from(
# select s.sales_id as sales, name
# from salesperson s left join orders o
# on s.sales_id = o.sales_id) a
# where a.sales != all(select distinct sales_id from orders o join company c on o.com_id = c.com_id where o.com_id = any (select com_id from company where name = 'RED'))

# Faster solution
SELECT name
FROM salesperson
WHERE sales_id NOT IN (SELECT DISTINCT sales_id
FROM orders
WHERE com_id = (SELECT com_id
FROM company
WHERE name = 'RED')) ;

-- ##########################################################################
-- Question 15
-- Write a SQL query to get the second highest salary from the Employee table.

-- +----+--------+
-- | Id | Salary |
-- +----+--------+
-- | 1  | 100    |
-- | 2  | 200    |
-- | 3  | 300    |
-- +----+--------+
-- For example, given the above Employee table, the query should return 200 as the second highest salary.
-- If there is no second highest salary, then the query should return null.

```
-- +---------------------+
-- | SecondHighestSalary |
-- +---------------------+
-- | 200                 |
-- +---------------------+


-- ======= Solution
================================================================================

select max(salary) as SecondHighestSalary
from employee
where salary ! = (Select max(salary)
                  from employee)

 -- ######################################################################
 -- Question 25
-- Table point holds the x coordinate of some points on x-axis in a plane, which are all integers.


-- Write a query to find the shortest distance between two points in these points.


-- | x   |
-- |-----|
-- | -1  |
-- | 0   |
-- | 2   |


-- The shortest distance is '1' obviously, which is from point '-1' to '0'. So the output is as below:


-- | shortest|
-- |---------|
-- | 1       |


-- Note: Every point is unique, which means there is no duplicates in table point

-- ======= Solution
================================================================================

select min(abs(abs(a.x)-abs(a.next_closest))) as shortest
from(
select *,
lead(x) over(order by x) as next_closest
from point) a

 -- ######################################################################
```

```
 -- Question 21
-- Table: ActorDirector

-- +-------------+---------+
-- | Column Name | Type    |
-- +-------------+---------+
-- | actor_id    | int     |
-- | director_id | int     |
-- | timestamp   | int     |
-- +-------------+---------+
-- timestamp is the primary key column for this table.


-- Write a SQL query for a report that provides the pairs (actor_id, director_id)

 -- ##########################################################################
 -- Question 23
-- Table: Students

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | student_id    | int     |
-- | student_name  | varchar |
-- +---------------+---------+
-- student_id is the primary key for this table.
-- Each row of this table contains the ID and the name of one student in the school.


-- Table: Subjects

-- +--------------+---------+
-- | Column Name  | Type    |
-- +--------------+---------+
-- | subject_name | varchar |
-- +--------------+---------+
-- subject_name is the primary key for this table.
-- Each row of this table contains the name of one subject in the school.


-- Table: Examinations

-- +--------------+---------+
-- | Column Name  | Type    |
-- +--------------+---------+
-- | student_id   | int     |
-- | subject_name | varchar |
-- +--------------+---------+
-- There is no primary key for this table. It may contain duplicates.
-- Each student from the Students table takes every course from Subjects table.
-- Each row of this table indicates that a student with ID student_id attended the exam of subject_name.
```

-- Write an SQL query to find the number of times each student attended each exam.

-- Order the result table by student_id and subject_name.

-- The query result format is in the following example:

-- Students table:
-- +------------+--------------+
-- | student_id | student_name |
-- +------------+--------------+
-- | 1 | Alice |
-- | 2 | Bob |
-- | 13 | John |
-- | 6 | Alex |
-- +------------+--------------+
-- Subjects table:
-- +--------------+
-- | subject_name |
-- +--------------+
-- | Math |
-- | Physics |
-- | Programming |
-- +--------------+
-- Examinations table:
-- +------------+--------------+
-- | student_id | subject_name |
-- +------------+--------------+
-- | 1 | Math |
-- | 1 | Physics |
-- | 1 | Programming |
-- | 2 | Programming |
-- | 1 | Physics |
-- | 1 | Math |
-- | 13 | Math |
-- | 13 | Programming |
-- | 13 | Physics |
-- | 2 | Math |
-- | 1 | Math |
-- +------------+--------------+
-- Result table:
-- +------------+--------------+--------------+----------------+
-- | student_id | student_name | subject_name | attended_exams |
-- +------------+--------------+--------------+----------------+
-- | 1 | Alice | Math | 3 |
-- | 1 | Alice | Physics | 2 |
-- | 1 | Alice | Programming | 1 |
-- | 2 | Bob | Math | 1 |
-- | 2 | Bob | Physics | 0 |
-- | 2 | Bob | Programming | 1 |

```
-- | 6          | Alex         | Math         | 0            |
-- | 6          | Alex         | Physics      | 0            |
-- | 6          | Alex         | Programming  | 0            |
-- | 13         | John         | Math         | 1            |
-- | 13         | John         | Physics      | 1            |
-- | 13         | John         | Programming  | 1            |
-- +------------+--------------+--------------+----------------+
-- The result table should contain all students and all subjects.
-- Alice attended Math exam 3 times, Physics exam 2 times and Programming exam 1 time.
-- Bob attended Math exam 1 time, Programming exam 1 time and didn't attend the Physics exam.
-- Alex didn't attend any exam.
-- John attended Math exam 1 time, Physics exam 1 time and Programming exam 1 time.

-- ======= Solution
================================================================================

Select a.student_id as student_id, a.student_name as student_name, a.subject_name as subject_name,
coalesce(attended_exams,0) as attended_exams
from(
select *
from students
cross join subjects
group by student_id, student_name, subject_name) a
left join
(Select e.student_id, student_name, subject_name, count(*) as attended_exams
from examinations e join students s
on e.student_id = s.student_id
group by e.student_id, student_name, subject_name) b
on a.student_id = b.student_id and a.subject_name =b.subject_name
order by a.student_id asc, a.subject_name asc

 -- ######################################################################
 -- Question 36
-- Table: Departments

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | id            | int     |
-- | name          | varchar |
-- +---------------+---------+
-- id is the primary key of this table.
-- The table has information about the id of each department of a university.


-- Table: Students

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | id            | int     |
```

-- | name | varchar |
-- | department_id | int |
-- +---------------+---------+
-- id is the primary key of this table.
-- The table has information about the id of each student at a university and the id of the department he/she studies at.

-- Write an SQL query to find the id and the name of all students who are enrolled in departments that no longer exists.

-- Return the result table in any order.

-- The query result format is in the following example:

-- Departments table:
-- +------+--------------------------+
-- | id | name |
-- +------+--------------------------+
-- | 1 | Electrical Engineering |
-- | 7 | Computer Engineering |
-- | 13 | Bussiness Administration |
-- +------+--------------------------+

-- Students table:
-- +------+----------+---------------+
-- | id | name | department_id |
-- +------+----------+---------------+
-- | 23 | Alice | 1 |
-- | 1 | Bob | 7 |
-- | 5 | Jennifer | 13 |
-- | 2 | John | 14 |
-- | 4 | Jasmine | 77 |
-- | 3 | Steve | 74 |
-- | 6 | Luis | 1 |
-- | 8 | Jonathan | 7 |
-- | 7 | Daiana | 33 |
-- | 11 | Madelynn | 1 |
-- +------+----------+---------------+

-- Result table:
-- +------+----------+
-- | id | name |
-- +------+----------+
-- | 2 | John |
-- | 7 | Daiana |
-- | 4 | Jasmine |
-- | 3 | Steve |
-- +------+----------+

-- John, Daiana, Steve and Jasmine are enrolled in departments 14, 33, 74 and 77 respectively.
-- department 14, 33, 74 and 77 doesn't exist in the Departments table.

-- ======= Solution
================================================================================

```
Select s.id, s.name
from students s left join
departments d
on s.department_id = d.id
where d.name is null
```

-- ######################################################################
-- Question 22
-- Given a table salary, such as the one below, that has m=male and f=female values.
-- Swap all f and m values (i.e., change all f values to m and vice versa) with
-- a single update statement and no intermediate temp table.

-- Note that you must write a single update statement, DO NOT write any select statement for this problem.

-- Example:

-- | id | name | sex | salary |
-- |----|------|-----|--------|
-- | 1  | A    | m   | 2500   |
-- | 2  | B    | f   | 1500   |
-- | 3  | C    | m   | 5500   |
-- | 4  | D    | f   | 500    |
-- After running your update statement, the above salary table should have the following rows:
-- | id | name | sex | salary |
-- |----|------|-----|--------|
-- | 1  | A    | f   | 2500   |
-- | 2  | B    | m   | 1500   |
-- | 3  | C    | f   | 5500   |
-- | 4  | D    | m   | 500    |

-- ======= Solution
================================================================================

```
Update salary
set sex = Case when sex = 'm' then 'f'
when sex = 'f' then 'm'
end;
```

-- ######################################################################
-- Question 1
-- Table: Users

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | id            | int     |
-- | name          | varchar |

```
-- +---------------+---------+
-- id is the primary key for this table.
-- name is the name of the user.


-- Table: Rides

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | id            | int     |
-- | user_id       | int     |
-- | distance      | int     |
-- +---------------+---------+
-- id is the primary key for this table.
-- user_id is the id of the user who travelled the distance "distance".


-- Write an SQL query to report the distance travelled by each user.

-- Return the result table ordered by travelled_distance in descending order,
-- if two or more users travelled the same distance, order them by their name in ascending order.

-- The query result format is in the following example.



-- Users table:
-- +------+-----------+
-- | id   | name      |
-- +------+-----------+
-- | 1    | Alice     |
-- | 2    | Bob       |
-- | 3    | Alex      |
-- | 4    | Donald    |
-- | 7    | Lee       |
-- | 13   | Jonathan  |
-- | 19   | Elvis     |
-- +------+-----------+

-- Rides table:
-- +------+----------+----------+
-- | id   | user_id  | distance |
-- +------+----------+----------+
-- | 1    | 1        | 120      |
-- | 2    | 2        | 317      |
-- | 3    | 3        | 222      |
-- | 4    | 7        | 100      |
-- | 5    | 13       | 312      |
-- | 6    | 19       | 50       |
-- | 7    | 7        | 120      |
```

```
-- | 8    | 19       | 400      |
-- | 9    | 7        | 230      |
-- +------+----------+----------+

-- Result table:
-- +----------+--------------------+
-- | name     | travelled_distance |
-- +----------+--------------------+
-- | Elvis    | 450                |
-- | Lee      | 450                |
-- | Bob      | 317                |
-- | Jonathan | 312                |
-- | Alex     | 222                |
-- | Alice    | 120                |
-- | Donald   | 0                  |
-- +----------+--------------------+
-- Elvis and Lee travelled 450 miles, Elvis is the top traveller as his name is alphabetically smaller than Lee.
-- Bob, Jonathan, Alex and Alice have only one ride and we just order them by the total distances of the ride.
-- Donald didn't have any rides, the distance travelled by him is 0.

-- ======= Solution
================================================================================

Select U.name as name, coalesce(sum(R.distance),0) as travelled_distance
from Users U left join Rides R
on R.user_id = U.id
group by name
Order by travelled_distance desc, name


 -- ######################################################################
 -- Question 16
-- A pupil Tim gets homework to identify whether three line segments could possibly form a triangle.


-- However, this assignment is very heavy because there are hundreds of records to calculate.


-- Could you help Tim by writing a query to judge whether these three sides can form a triangle,
-- assuming table triangle holds the length of the three sides x, y and z.


-- | x  | y  | z  |
-- |----|----|----|
-- | 13 | 15 | 30 |
-- | 10 | 20 | 15 |
-- For the sample data above, your query should return the follow result:
-- | x  | y  | z  | triangle |
-- |----|----|----|----------|
-- | 13 | 15 | 30 | No       |
-- | 10 | 20 | 15 | Yes      |
```

-- ======= Solution
==========

```
select x, y, z,
case
when x+y > z and x+z > y and  y+z > x  then 'Yes'
when x=y and y=z then 'Yes'
else 'No'
end as Triangle
from triangle
```

-- ##########
-- Question 40
-- Table: Activity

```
-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | user_id       | int     |
-- | session_id    | int     |
-- | activity_date | date    |
-- | activity_type | enum    |
-- +---------------+---------+
```

-- There is no primary key for this table, it may have duplicate rows.
-- The activity_type column is an ENUM of type ('open_session', 'end_session', 'scroll_down', 'send_message').
-- The table shows the user activities for a social media website.
-- Note that each session belongs to exactly one user.

-- Write an SQL query to find the daily active user count for a period of 30 days ending 2019-07-27 inclusively. A user was active on some day if he/she made at least one activity on that day.

-- The query result format is in the following example:

-- Activity table:

```
-- +---------+------------+---------------+---------------+
-- | user_id | session_id | activity_date | activity_type |
-- +---------+------------+---------------+---------------+
-- | 1       | 1          | 2019-07-20    | open_session  |
-- | 1       | 1          | 2019-07-20    | scroll_down   |
-- | 1       | 1          | 2019-07-20    | end_session   |
-- | 2       | 4          | 2019-07-20    | open_session  |
-- | 2       | 4          | 2019-07-21    | send_message  |
-- | 2       | 4          | 2019-07-21    | end_session   |
-- | 3       | 2          | 2019-07-21    | open_session  |
-- | 3       | 2          | 2019-07-21    | send_message  |
-- | 3       | 2          | 2019-07-21    | end_session   |
-- | 4       | 3          | 2019-06-25    | open_session  |
-- | 4       | 3          | 2019-06-25    | end_session   |
```

```
-- +---------+------------+---------------+---------------+

-- Result table:
-- +------------+--------------+
-- | day        | active_users |
-- +------------+--------------+
-- | 2019-07-20 | 2            |
-- | 2019-07-21 | 2            |
-- +------------+--------------+
-- Note that we do not care about days with zero active users.

-- ======= Solution
================================================================================

Select activity_date as day, count(distinct user_id) as active_users
from activity
where activity_date > '2019-06-26' and activity_date < '2019-07-27'
group by activity_date

 -- ########################################################################
 -- Question 35
-- Table: Activity

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | user_id       | int     |
-- | session_id    | int     |
-- | activity_date | date    |
-- | activity_type | enum    |
-- +---------------+---------+
-- There is no primary key for this table, it may have duplicate rows.
-- The activity_type column is an ENUM of type ('open_session', 'end_session', 'scroll_down', 'send_message').
-- The table shows the user activities for a social media website.
-- Note that each session belongs to exactly one user.


-- Write an SQL query to find the average number of sessions per user for a period of 30 days ending 2019-07-27 inclusively, rounded to 2 decimal places. The sessions we want to count for a user are those with at least one activity in that time period.

-- The query result format is in the following example:

-- Activity table:
-- +---------+------------+---------------+---------------+
-- | user_id | session_id | activity_date | activity_type |
-- +---------+------------+---------------+---------------+
-- | 1       | 1          | 2019-07-20    | open_session  |
-- | 1       | 1          | 2019-07-20    | scroll_down   |
-- | 1       | 1          | 2019-07-20    | end_session   |
-- | 2       | 4          | 2019-07-20    | open_session  |
```

```
-- | 2       | 4         | 2019-07-21    | send_message  |
-- | 2       | 4         | 2019-07-21    | end_session   |
-- | 3       | 2         | 2019-07-21    | open_session  |
-- | 3       | 2         | 2019-07-21    | send_message  |
-- | 3       | 2         | 2019-07-21    | end_session   |
-- | 3       | 5         | 2019-07-21    | open_session  |
-- | 3       | 5         | 2019-07-21    | scroll_down   |
-- | 3       | 5         | 2019-07-21    | end_session   |
-- | 4       | 3         | 2019-06-25    | open_session  |
-- | 4       | 3         | 2019-06-25    | end_session   |
-- +---------+-----------+---------------+---------------+

-- Result table:
-- +--------------------------+
-- | average_sessions_per_user |
-- +--------------------------+
-- | 1.33                     |
-- +--------------------------+
-- User 1 and 2 each had 1 session in the past 30 days while user 3 had 2 sessions so the average is (1 + 1 + 2) / 3 = 1.33.


-- ======= Solution
================================================================================

select ifnull(round(avg(a.num),2),0) as average_sessions_per_user
from (
select count(distinct session_id) as num
from activity
where activity_date between '2019-06-28' and '2019-07-27'
group by user_id) a

 -- ########################################################################
 -- Question 46
-- Table: Countries

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | country_id    | int     |
-- | country_name  | varchar |
-- +---------------+---------+
-- country_id is the primary key for this table.
-- Each row of this table contains the ID and the name of one country.


-- Table: Weather

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | country_id    | int     |
```

-- | weather_state | varchar |
-- | day | date |
-- +---------------+---------+
-- (country_id, day) is the primary key for this table.
-- Each row of this table indicates the weather state in a country for one day.

-- Write an SQL query to find the type of weather in each country for November 2019.

-- The type of weather is Cold if the average weather_state is less than or equal 15, Hot if the average weather_state is greater than or equal 25 and Warm otherwise.

-- Return result table in any order.

-- The query result format is in the following example:

-- Countries table:
-- +------------+--------------+
-- | country_id | country_name |
-- +------------+--------------+
-- | 2 | USA |
-- | 3 | Australia |
-- | 7 | Peru |
-- | 5 | China |
-- | 8 | Morocco |
-- | 9 | Spain |
-- +------------+--------------+
-- Weather table:
-- +------------+---------------+------------+
-- | country_id | weather_state | day |
-- +------------+---------------+------------+
-- | 2 | 15 | 2019-11-01 |
-- | 2 | 12 | 2019-10-28 |
-- | 2 | 12 | 2019-10-27 |
-- | 3 | -2 | 2019-11-10 |
-- | 3 | 0 | 2019-11-11 |
-- | 3 | 3 | 2019-11-12 |
-- | 5 | 16 | 2019-11-07 |
-- | 5 | 18 | 2019-11-09 |
-- | 5 | 21 | 2019-11-23 |
-- | 7 | 25 | 2019-11-28 |
-- | 7 | 22 | 2019-12-01 |
-- | 7 | 20 | 2019-12-02 |
-- | 8 | 25 | 2019-11-05 |
-- | 8 | 27 | 2019-11-15 |
-- | 8 | 31 | 2019-11-25 |
-- | 9 | 7 | 2019-10-23 |
-- | 9 | 3 | 2019-12-23 |
-- +------------+---------------+------------+
-- Result table:
-- +--------------+--------------+

```
-- | country_name | weather_type |
-- +--------------+--------------+
-- | USA          | Cold         |
-- | Austraila    | Cold         |
-- | Peru         | Hot          |
-- | China        | Warm         |
-- | Morocco      | Hot          |
-- +--------------+--------------+
-- Average weather_state in USA in November is (15) / 1 = 15 so weather type is Cold.
-- Average weather_state in Austraila in November is (-2 + 0 + 3) / 3 = 0.333 so weather type is Cold.
-- Average weather_state in Peru in November is (25) / 1 = 25 so weather type is Hot.
-- Average weather_state in China in November is (16 + 18 + 21) / 3 = 18.333 so weather type is Warm.
-- Average weather_state in Morocco in November is (25 + 27 + 31) / 3 = 27.667 so weather type is Hot.
-- We know nothing about average weather_state in Spain in November
-- so we don't include it in the result table.

-- ======= Solution
================================================================================

Select c.country_name,
                                        case when avg(w.weather_state)<=15 then 'Cold'
                                             when avg(w.weather_state)>=25 then 'Hot'
                                            else 'Warm'
                                        end as weather_type
                                    from weather w join
                                    countries c
                                on w.country_id = c.country_id
                            where month(day) = 11
group by c.country_name


 -- ######################################################################
 -- Question 65
-- Table: Events

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | business_id   | int     |
-- | event_type    | varchar |
-- | occurences    | int     |
-- +---------------+---------+
-- (business_id, event_type) is the primary key of this table.
-- Each row in the table logs the info that an event of some type occured at some business for a number of times.


-- Write an SQL query to find all active businesses.

-- An active business is a business that has more than one event type with occurences greater than the average occurences of that event type among all businesses.
```

-- The query result format is in the following example:

-- Events table:
-- +-------------+------------+------------+
-- | business_id | event_type | occurences |
-- +-------------+------------+------------+
-- | 1 | reviews | 7 |
-- | 3 | reviews | 3 |
-- | 1 | ads | 11 |
-- | 2 | ads | 7 |
-- | 3 | ads | 6 |
-- | 1 | page views | 3 |
-- | 2 | page views | 12 |
-- +-------------+------------+------------+

-- Result table:
-- +-------------+
-- | business_id |
-- +-------------+
-- | 1 |
-- +-------------+
-- Average for 'reviews', 'ads' and 'page views' are (7+3)/2=5, (11+7+6)/3=8, (3+12)/2=7.5 respectively.
-- Business with id 1 has 7 'reviews' events (more than 5) and 11 'ads' events (more than 8) so it is an active business.

-- ======= Solution
==========

```
select c.business_id
from(
select *
from events e
join
(select event_type as event, round(avg(occurences),2) as average from events group by event_type) b
on e.event_type = b.event) c
where c.occurences>c.average
group by c.business_id
having count(*) > 1
```

--Question 94
-- Table Accounts:

-- +---------------+---------+
-- | Column Name | Type |
-- +---------------+---------+
-- | id | int |
-- | name | varchar |
-- +---------------+---------+
-- the id is the primary key for this table.
-- This table contains the account id and the user name of each account.

-- Table Logins:

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | id            | int     |
-- | login_date    | date    |
-- +---------------+---------+
-- There is no primary key for this table, it may contain duplicates.
-- This table contains the account id of the user who logged in and the login date. A user may log in multiple times in the day.

-- Write an SQL query to find the id and the name of active users.

-- Active users are those who logged in to their accounts for 5 or more consecutive days.

-- Return the result table ordered by the id.

-- The query result format is in the following example:

-- Accounts table:
-- +----+----------+
-- | id | name     |
-- +----+----------+
-- | 1  | Winston  |
-- | 7  | Jonathan |
-- +----+----------+

-- Logins table:
-- +----+------------+
-- | id | login_date |
-- +----+------------+
-- | 7  | 2020-05-30 |
-- | 1  | 2020-05-30 |
-- | 7  | 2020-05-31 |
-- | 7  | 2020-06-01 |
-- | 7  | 2020-06-02 |
-- | 7  | 2020-06-02 |
-- | 7  | 2020-06-03 |
-- | 1  | 2020-06-07 |
-- | 7  | 2020-06-10 |
-- +----+------------+

-- Result table:
-- +----+----------+
-- | id | name     |
-- +----+----------+
-- | 7  | Jonathan |
-- +----+----------+

-- User Winston with id = 1 logged in 2 times only in 2 different days, so, Winston is not an active user.
-- User Jonathan with id = 7 logged in 7 times in 6 different days, five of them were consecutive days, so, Jonathan is an active user.

-- ======= Solution
==========

```
with t1 as (
select id,login_date,
lead(login_date,4) over(partition by id order by login_date) date_5
from (select distinct * from Logins) b
)

select distinct a.id, a.name from t1
inner join accounts a
on t1.id = a.id
where datediff(t1.date_5,login_date) = 4
order by id
```

-- ##########################################################################
-- Question 77
-- Table: Friends

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | id            | int     |
-- | name          | varchar |
-- | activity      | varchar |
-- +---------------+---------+
-- id is the id of the friend and primary key for this table.
-- name is the name of the friend.
-- activity is the name of the activity which the friend takes part in.
-- Table: Activities

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | id            | int     |
-- | name          | varchar |
-- +---------------+---------+
-- id is the primary key for this table.
-- name is the name of the activity.

-- Write an SQL query to find the names of all the activities with neither maximum, nor minimum number of participants.

-- Return the result table in any order. Each activity in table Activities is performed by any person in the table Friends.

-- The query result format is in the following example:

```
-- Friends table:
-- +------+--------------+---------------+
-- | id   | name         | activity      |
-- +------+--------------+---------------+
-- | 1    | Jonathan D.  | Eating        |
-- | 2    | Jade W.      | Singing       |
-- | 3    | Victor J.    | Singing       |
-- | 4    | Elvis Q.     | Eating        |
-- | 5    | Daniel A.    | Eating        |
-- | 6    | Bob B.       | Horse Riding  |
-- +------+--------------+---------------+

-- Activities table:
-- +------+--------------+
-- | id   | name         |
-- +------+--------------+
-- | 1    | Eating       |
-- | 2    | Singing      |
-- | 3    | Horse Riding |
-- +------+--------------+

-- Result table:
-- +--------------+
-- | activity     |
-- +--------------+
-- | Singing      |
-- +--------------+

-- Eating activity is performed by 3 friends, maximum number of participants, (Jonathan D. , Elvis Q. and Daniel A.)
-- Horse Riding activity is performed by 1 friend, minimum number of participants, (Bob B.)
-- Singing is performed by 2 friends (Victor J. and Jade W.)

-- ======= Solution
================================================================================

with t1 as(
select max(a.total) as total
from(
   select activity, count(*) as total
   from friends
   group by activity) a
         union all
         select min(b.total) as low
   from(
   select activity, count(*) as total
   from friends
   group by activity) b),
t2 as
(
   select activity, count(*) as total
```

```
   from friends
   group by activity
)

select activity
from t1 right join t2
on t1.total = t2.total
where t1.total is null


 -- ######################################################################
 -- Question 55
-- Table: Employees

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | employee_id   | int     |
-- | employee_name | varchar |
-- | manager_id    | int     |
-- +---------------+---------+
-- employee_id is the primary key for this table.
-- Each row of this table indicates that the employee with ID employee_id and name employee_name reports his
-- work to his/her direct manager with manager_id
-- The head of the company is the employee with employee_id = 1.


-- Write an SQL query to find employee_id of all employees that directly or indirectly report their work to the head of
the company.

-- The indirect relation between managers will not exceed 3 managers as the company is small.

-- Return result table in any order without duplicates.

-- The query result format is in the following example:

-- Employees table:
-- +-------------+---------------+------------+
-- | employee_id | employee_name | manager_id |
-- +-------------+---------------+------------+
-- | 1           | Boss          | 1          |
-- | 3           | Alice         | 3          |
-- | 2           | Bob           | 1          |
-- | 4           | Daniel        | 2          |
-- | 7           | Luis          | 4          |
-- | 8           | Jhon          | 3          |
-- | 9           | Angela        | 8          |
-- | 77          | Robert        | 1          |
-- +-------------+---------------+------------+

-- Result table:
```

```
-- +-------------+
-- | employee_id |
-- +-------------+
-- | 2           |
-- | 77          |
-- | 4           |
-- | 7           |
-- +-------------+

-- The head of the company is the employee with employee_id 1.
-- The employees with employee_id 2 and 77 report their work directly to the head of the company.
-- The employee with employee_id 4 report his work indirectly to the head of the company 4 --> 2 --> 1.
-- The employee with employee_id 7 report his work indirectly to the head of the company 7 --> 4 --> 2 --> 1.
-- The employees with employee_id 3, 8 and 9 don't report their work to head of company directly or indirectly.

-- ======= Solution
================================================================================

select employee_id
from employees
where manager_id = 1 and employee_id != 1
union
select employee_id
from employees
where manager_id = any (select employee_id
from employees
where manager_id = 1 and employee_id != 1)
union
select employee_id
from employees
where manager_id = any (select employee_id
from employees
where manager_id = any (select employee_id
from employees
where manager_id = 1 and employee_id != 1))



 -- ######################################################################
 -- Question 66
-- Table: Sales

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | sale_date     | date    |
-- | fruit         | enum    |
-- | sold_num      | int     |
-- +---------------+---------+
-- (sale_date,fruit) is the primary key for this table.
-- This table contains the sales of "apples" and "oranges" sold each day.
```

-- Write an SQL query to report the difference between number of apples and oranges sold each day.

-- Return the result table ordered by sale_date in format ('YYYY-MM-DD').

-- The query result format is in the following example:

-- Sales table:
-- +------------+------------+-------------+
-- | sale_date  | fruit      | sold_num    |
-- +------------+------------+-------------+
-- | 2020-05-01 | apples     | 10          |
-- | 2020-05-01 | oranges    | 8           |
-- | 2020-05-02 | apples     | 15          |
-- | 2020-05-02 | oranges    | 15          |
-- | 2020-05-03 | apples     | 20          |
-- | 2020-05-03 | oranges    | 0           |
-- | 2020-05-04 | apples     | 15          |
-- | 2020-05-04 | oranges    | 16          |
-- +------------+------------+-------------+

-- Result table:
-- +------------+--------------+
-- | sale_date  | diff         |
-- +------------+--------------+
-- | 2020-05-01 | 2            |
-- | 2020-05-02 | 0            |
-- | 2020-05-03 | 20           |
-- | 2020-05-04 | -1           |
-- +------------+--------------+

-- Day 2020-05-01, 10 apples and 8 oranges were sold (Difference  10 - 8 = 2).
-- Day 2020-05-02, 15 apples and 15 oranges were sold (Difference 15 - 15 = 0).
-- Day 2020-05-03, 20 apples and 0 oranges were sold (Difference 20 - 0 = 20).
-- Day 2020-05-04, 15 apples and 16 oranges were sold (Difference 15 - 16 = -1).

-- ======= Solution
==========

```
Select sale_date, sold_num-sold as diff
from
((select *
from sales
where fruit = 'apples') a
join
(select sale_date as sale, fruit, sold_num as sold
from sales
where fruit = 'oranges') b
```

on a.sale_date = b.sale)

-- ######################################################################
-- Question 81
-- Table: Views

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | article_id    | int     |
-- | author_id     | int     |
-- | viewer_id     | int     |
-- | view_date     | date    |
-- +---------------+---------+
-- There is no primary key for this table, it may have duplicate rows.
-- Each row of this table indicates that some viewer viewed an article (written by some author) on some date.
-- Note that equal author_id and viewer_id indicate the same person.

-- Write an SQL query to find all the people who viewed more than one article on the same date, sorted in ascending order by their id.

-- The query result format is in the following example:

-- Views table:
-- +------------+-----------+-----------+------------+
-- | article_id | author_id | viewer_id | view_date  |
-- +------------+-----------+-----------+------------+
-- | 1          | 3         | 5         | 2019-08-01 |
-- | 3          | 4         | 5         | 2019-08-01 |
-- | 1          | 3         | 6         | 2019-08-02 |
-- | 2          | 7         | 7         | 2019-08-01 |
-- | 2          | 7         | 6         | 2019-08-02 |
-- | 4          | 7         | 1         | 2019-07-22 |
-- | 3          | 4         | 4         | 2019-07-21 |
-- | 3          | 4         | 4         | 2019-07-21 |
-- +------------+-----------+-----------+------------+

-- Result table:
-- +------+
-- | id   |
-- +------+
-- | 5    |
-- | 6    |
-- +------+

-- ======= Solution
==========

```
select distinct viewer_id as id#, count(distinct article_id) as total
from views
group by viewer_id, view_date
having count(distinct article_id)>1
order by 1
```

```
 -- ##########################################################################
 -- Question 74
-- Table Salaries:

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | company_id    | int     |
-- | employee_id   | int     |
-- | employee_name | varchar |
-- | salary        | int     |
-- +---------------+---------+
-- (company_id, employee_id) is the primary key for this table.
-- This table contains the company id, the id, the name and the salary for an employee.


-- Write an SQL query to find the salaries of the employees after applying taxes.

-- The tax rate is calculated for each company based on the following criteria:

-- 0% If the max salary of any employee in the company is less than 1000$.
-- 24% If the max salary of any employee in the company is in the range [1000, 10000] inclusive.
-- 49% If the max salary of any employee in the company is greater than 10000$.
-- Return the result table in any order. Round the salary to the nearest integer.

-- The query result format is in the following example:

-- Salaries table:
-- +------------+-------------+---------------+--------+
-- | company_id | employee_id | employee_name | salary |
-- +------------+-------------+---------------+--------+
-- | 1          | 1           | Tony          | 2000   |
-- | 1          | 2           | Pronub        | 21300  |
-- | 1          | 3           | Tyrrox        | 10800  |
-- | 2          | 1           | Pam           | 300    |
-- | 2          | 7           | Bassem        | 450    |
-- | 2          | 9           | Hermione      | 700    |
-- | 3          | 7           | Bocaben       | 100    |
-- | 3          | 2           | Ognjen        | 2200   |
-- | 3          | 13          | Nyancat       | 3300   |
-- | 3          | 15          | Morninngcat   | 1866   |
-- +------------+-------------+---------------+--------+
```

```
-- Result table:
-- +------------+-------------+---------------+--------+
-- | company_id | employee_id | employee_name | salary |
-- +------------+-------------+---------------+--------+
-- | 1          | 1           | Tony          | 1020   |
-- | 1          | 2           | Pronub        | 10863  |
-- | 1          | 3           | Tyrrox        | 5508   |
-- | 2          | 1           | Pam           | 300    |
-- | 2          | 7           | Bassem        | 450    |
-- | 2          | 9           | Hermione      | 700    |
-- | 3          | 7           | Bocaben       | 76     |
-- | 3          | 2           | Ognjen        | 1672   |
-- | 3          | 13          | Nyancat       | 2508   |
-- | 3          | 15          | Morninngcat   | 5911   |
-- +------------+-------------+---------------+--------+
-- For company 1, Max salary is 21300. Employees in company 1 have taxes = 49%
-- For company 2, Max salary is 700. Employees in company 2 have taxes = 0%
-- For company 3, Max salary is 7777. Employees in company 3 have taxes = 24%
-- The salary after taxes = salary - (taxes percentage / 100) * salary
-- For example, Salary for Morninngcat (3, 15) after taxes = 7777 - 7777 * (24 / 100) = 7777 - 1866.48 = 5910.52, which is
rounded to 5911.

-- ======= Solution
================================================================================

with t1 as (
select company_id, employee_id, employee_name, salary as sa, max(salary) over(partition by company_id) as maximum
from salaries)

select company_id, employee_id, employee_name,
case when t1.maximum<1000 then t1.sa
when t1.maximum between 1000 and 10000 then round(t1.sa*.76,0)
else round(t1.sa*.51,0)
end as salary
from t1

 -- ##########################################################################
 -- Question 61
-- Table: Stocks

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | stock_name    | varchar |
-- | operation     | enum    |
-- | operation_day | int     |
-- | price         | int     |
-- +---------------+---------+
-- (stock_name, day) is the primary key for this table.
-- The operation column is an ENUM of type ('Sell', 'Buy')
```

-- Each row of this table indicates that the stock which has stock_name had an operation on the day operation_day with the price.
-- It is guaranteed that each 'Sell' operation for a stock has a corresponding 'Buy' operation in a previous day.

-- Write an SQL query to report the Capital gain/loss for each stock.

-- The capital gain/loss of a stock is total gain or loss after buying and selling the stock one or many times.

-- Return the result table in any order.

-- The query result format is in the following example:

-- Stocks table:
-- +---------------+-----------+---------------+--------+
-- | stock_name    | operation | operation_day | price  |
-- +---------------+-----------+---------------+--------+
-- | Leetcode      | Buy       | 1             | 1000   |
-- | Corona Masks  | Buy       | 2             | 10     |
-- | Leetcode      | Sell      | 5             | 9000   |
-- | Handbags      | Buy       | 17            | 30000  |
-- | Corona Masks  | Sell      | 3             | 1010   |
-- | Corona Masks  | Buy       | 4             | 1000   |
-- | Corona Masks  | Sell      | 5             | 500    |
-- | Corona Masks  | Buy       | 6             | 1000   |
-- | Handbags      | Sell      | 29            | 7000   |
-- | Corona Masks  | Sell      | 10            | 10000  |
-- +---------------+-----------+---------------+--------+

-- Result table:
-- +---------------+-------------------+
-- | stock_name    | capital_gain_loss |
-- +---------------+-------------------+
-- | Corona Masks  | 9500              |
-- | Leetcode      | 8000              |
-- | Handbags      | -23000            |
-- +---------------+-------------------+
-- Leetcode stock was bought at day 1 for 1000$ and was sold at day 5 for 9000$. Capital gain = 9000 - 1000 = 8000$.
-- Handbags stock was bought at day 17 for 30000$ and was sold at day 29 for 7000$. Capital loss = 7000 - 30000 = -23000$.
-- Corona Masks stock was bought at day 1 for 10$ and was sold at day 3 for 1010$. It was bought again at day 4 for 1000$ and was sold at day 5 for 500$. At last, it was bought at day 6 for 1000$ and was sold at day 10 for 10000$. Capital gain/loss is the sum of capital gains/losses for each ('Buy' --> 'Sell')
-- operation = (1010 - 10) + (500 - 1000) + (10000 - 1000) = 1000 - 500 + 9000 = 9500$.

-- ======= Solution
==========

```
select stock_name, (one-two) as capital_gain_loss
from(
(select stock_name, sum(price) as one
```

```
from stocks
where operation = 'Sell'
group by stock_name) b
left join
(select stock_name as name, sum(price) as two
from stocks
where operation = 'Buy'
group by stock_name) c
on b.stock_name = c.name)
order by capital_gain_loss desc

 -- ##########################################################################
 -- Question 52
-- Write a SQL query to find all numbers that appear at least three times consecutively.

-- +----+-----+
-- | Id | Num |
-- +----+-----+
-- | 1  |  1  |
-- | 2  |  1  |
-- | 3  |  1  |
-- | 4  |  2  |
-- | 5  |  1  |
-- | 6  |  2  |
-- | 7  |  2  |
-- +----+-----+
-- For example, given the above Logs table, 1 is the only number that appears consecutively for at least three times.

-- +-----------------+
-- | ConsecutiveNums |
-- +-----------------+
-- | 1               |
-- +-----------------+

-- ======= Solution
================================================================================

select distinct a.num as ConsecutiveNums
from(
select *,
lag(num) over() as prev,
lead(num) over() as next
from logs) a
where a.num = a.prev and a.num=a.next


 -- ##########################################################################
 -- Question 87
-- A university uses 2 data tables, student and department, to store data about its students
-- and the departments associated with each major.
```

-- Write a query to print the respective department name and number of students majoring in each
-- department for all departments in the department table (even ones with no current students).

-- Sort your results by descending number of students; if two or more departments have the same number of students,
-- then sort those departments alphabetically by department name.

-- The student is described as follow:

-- | Column Name  | Type      |
-- |--------------|-----------|
-- | student_id   | Integer   |
-- | student_name | String    |
-- | gender       | Character |
-- | dept_id      | Integer   |
-- where student_id is the student's ID number, student_name is the student's name, gender is their gender, and dept_id is the department ID associated with their declared major.

-- And the department table is described as below:

-- | Column Name | Type    |
-- |-------------|---------|
-- | dept_id     | Integer |
-- | dept_name   | String  |
-- where dept_id is the department's ID number and dept_name is the department name.

-- Here is an example input:
-- student table:

-- | student_id | student_name | gender | dept_id |
-- |------------|--------------|--------|---------|
-- | 1          | Jack         | M      | 1       |
-- | 2          | Jane         | F      | 1       |
-- | 3          | Mark         | M      | 2       |
-- department table:

-- | dept_id | dept_name   |
-- |---------|-------------|
-- | 1       | Engineering |
-- | 2       | Science     |
-- | 3       | Law         |
-- The Output should be:

-- | dept_name   | student_number |
-- |-------------|----------------|
-- | Engineering | 2              |
-- | Science     | 1              |
-- | Law         | 0              |

-- ======= Solution
==========

```
select dept_name, count(s.dept_id) as student_number
from department d
left join student s
on d.dept_id = s.dept_id
group by d.dept_id
order by count(s.dept_id) desc, dept_name
```

```
 -- ##########################################################################
 -- Question 110
-- Table Person:

-- +----------------+---------+
-- | Column Name    | Type    |
-- +----------------+---------+
-- | id             | int     |
-- | name           | varchar |
-- | phone_number   | varchar |
-- +----------------+---------+
-- id is the primary key for this table.
-- Each row of this table contains the name of a person and their phone number.
-- Phone number will be in the form 'xxx-yyyyyyy' where xxx is the country code (3 characters) and yyyyyyy is the
-- phone number (7 characters) where x and y are digits. Both can contain leading zeros.
-- Table Country:

-- +----------------+---------+
-- | Column Name    | Type    |
-- +----------------+---------+
-- | name           | varchar |
-- | country_code   | varchar |
-- +----------------+---------+
-- country_code is the primary key for this table.
-- Each row of this table contains the country name and its code. country_code will be in the form 'xxx' where x is digits.


-- Table Calls:

-- +-------------+------+
-- | Column Name | Type |
-- +-------------+------+
-- | caller_id   | int  |
-- | callee_id   | int  |
-- | duration    | int  |
-- +-------------+------+
-- There is no primary key for this table, it may contain duplicates.
-- Each row of this table contains the caller id, callee id and the duration of the call in minutes. caller_id != callee_id
-- A telecommunications company wants to invest in new countries. The country intends to invest in the countries
where the average call duration of the calls in this country is strictly greater than the global average call duration.
```

-- Write an SQL query to find the countries where this company can invest.

-- Return the result table in any order.

-- The query result format is in the following example.

-- Person table:
-- +----+----------+--------------+
-- | id | name     | phone_number |
-- +----+----------+--------------+
-- | 3  | Jonathan | 051-1234567  |
-- | 12 | Elvis    | 051-7654321  |
-- | 1  | Moncef   | 212-1234567  |
-- | 2  | Maroua   | 212-6523651  |
-- | 7  | Meir     | 972-1234567  |
-- | 9  | Rachel   | 972-0011100  |
-- +----+----------+--------------+

-- Country table:
-- +----------+--------------+
-- | name     | country_code |
-- +----------+--------------+
-- | Peru     | 051          |
-- | Israel   | 972          |
-- | Morocco  | 212          |
-- | Germany  | 049          |
-- | Ethiopia | 251          |
-- +----------+--------------+

-- Calls table:
-- +-----------+-----------+----------+
-- | caller_id | callee_id | duration |
-- +-----------+-----------+----------+
-- | 1         | 9         | 33       |
-- | 2         | 9         | 4        |
-- | 1         | 2         | 59       |
-- | 3         | 12        | 102      |
-- | 3         | 12        | 330      |
-- | 12        | 3         | 5        |
-- | 7         | 9         | 13       |
-- | 7         | 1         | 3        |
-- | 9         | 7         | 1        |
-- | 1         | 7         | 7        |
-- +-----------+-----------+----------+

-- Result table:
-- +----------+
-- | country  |
-- +----------+
-- | Peru     |

```
-- +----------+
-- The average call duration for Peru is (102 + 102 + 330 + 330 + 5 + 5) / 6 = 145.666667
-- The average call duration for Israel is (33 + 4 + 13 + 13 + 3 + 1 + 1 + 7) / 8 = 9.37500
-- The average call duration for Morocco is (33 + 4 + 59 + 59 + 3 + 7) / 6 = 27.5000
-- Global call duration average = (2 * (33 + 3 + 59 + 102 + 330 + 5 + 13 + 3 + 1 + 7)) / 20 = 55.70000
-- Since Peru is the only country where average call duration is greater than the global average, it's the only
recommended country.

-- ======= Solution
================================================================================

with t1 as(
select caller_id as id, duration as total
from
(select caller_id, duration
from calls
union all
select callee_id, duration
from calls) a
)
select name as country
from
(select distinct avg(total) over(partition by code) as avg_call, avg(total) over() as global_avg, c.name
from
((select *, coalesce(total,0) as duration, substring(phone_number from 1 for 3) as code
from person right join t1
using (id)) b
join country c
on c.country_code = b.code)) d
where avg_call > global_avg



 -- ######################################################################
 -- Question 72
-- Table: Customers

-- +---------------------+---------+
-- | Column Name         | Type    |
-- +---------------------+---------+
-- | customer_id         | int     |
-- | customer_name       | varchar |
-- +---------------------+---------+
-- customer_id is the primary key for this table.
-- customer_name is the name of the customer.


-- Table: Orders

-- +---------------+---------+
-- | Column Name   | Type    |
```

-- +---------------+---------+
-- | order_id      | int     |
-- | customer_id   | int     |
-- | product_name  | varchar |
-- +---------------+---------+
-- order_id is the primary key for this table.
-- customer_id is the id of the customer who bought the product "product_name".


-- Write an SQL query to report the customer_id and customer_name of customers who bought products "A", "B" but did not buy the product "C" since we want to recommend them buy this product.

-- Return the result table ordered by customer_id.

-- The query result format is in the following example.



-- Customers table:
-- +-------------+---------------+
-- | customer_id | customer_name |
-- +-------------+---------------+
-- | 1           | Daniel        |
-- | 2           | Diana         |
-- | 3           | Elizabeth     |
-- | 4           | Jhon          |
-- +-------------+---------------+

-- Orders table:
-- +------------+--------------+---------------+
-- | order_id   | customer_id  | product_name  |
-- +------------+--------------+---------------+
-- | 10         |    1         |    A          |
-- | 20         |    1         |    B          |
-- | 30         |    1         |    D          |
-- | 40         |    1         |    C          |
-- | 50         |    2         |    A          |
-- | 60         |    3         |    A          |
-- | 70         |    3         |    B          |
-- | 80         |    3         |    D          |
-- | 90         |    4         |    C          |
-- +------------+--------------+---------------+

-- Result table:
-- +-------------+---------------+
-- | customer_id | customer_name |
-- +-------------+---------------+
-- | 3           | Elizabeth     |
-- +-------------+---------------+
-- Only the customer_id with id 3 bought the product A and B but not the product C.

-- ======= Solution
==========

```
with t1 as
(
select customer_id
from orders
where product_name = 'B' and
customer_id in (select customer_id
from orders
where product_name = 'A'))

Select t1.customer_id, c.customer_name
from t1 join customers c
on t1.customer_id = c.customer_id
where t1.customer_id != all(select customer_id
from orders
where product_name = 'C')
```

-- ##########################################################################
-- Question 93
-- Table: Customer

```
-- +-------------+---------+
-- | Column Name | Type    |
-- +-------------+---------+
-- | customer_id | int     |
-- | product_key | int     |
-- +-------------+---------+
```

-- product_key is a foreign key to Product table.
-- Table: Product

```
-- +-------------+---------+
-- | Column Name | Type    |
-- +-------------+---------+
-- | product_key | int     |
-- +-------------+---------+
```

-- product_key is the primary key column for this table.

-- Write an SQL query for a report that provides the customer ids from the Customer table that bought all the products in the Product table.

-- For example:

-- Customer table:

```
-- +-------------+-------------+
-- | customer_id | product_key |
-- +-------------+-------------+
```

```
-- | 1           | 5           |
-- | 2           | 6           |
-- | 3           | 5           |
-- | 3           | 6           |
-- | 1           | 6           |
-- +-------------+-------------+

-- Product table:
-- +-------------+
-- | product_key |
-- +-------------+
-- | 5           |
-- | 6           |
-- +-------------+

-- Result table:
-- +-------------+
-- | customer_id |
-- +-------------+
-- | 1           |
-- | 3           |
-- +-------------+
-- The customers who bought all the products (5 and 6) are customers with id 1 and 3.

-- ======= Solution
================================================================================

select customer_id
from customer
group by customer_id
having count(distinct product_key) = (select COUNT(distinct product_key) from product)

 -- ######################################################################
 -- Question 57
-- The Employee table holds all employees. Every employee has an Id, a salary, and there is also a column for the
department Id.

-- +----+-------+--------+--------------+
-- | Id | Name  | Salary | DepartmentId |
-- +----+-------+--------+--------------+
-- | 1  | Joe   | 70000  | 1            |
-- | 2  | Jim   | 90000  | 1            |
-- | 3  | Henry | 80000  | 2            |
-- | 4  | Sam   | 60000  | 2            |
-- | 5  | Max   | 90000  | 1            |
-- +----+-------+--------+--------------+
-- The Department table holds all departments of the company.

-- +----+----------+
-- | Id | Name     |
-- +----+----------+
```

-- | 1  | IT       |
-- | 2  | Sal
es    |
-- +----+----------+
-- Write a SQL query to find employees who have the highest salary in each of the departments.
-- For the above tables, your SQL query should return the following rows (order of rows does not matter).

-- +------------+----------+--------+
-- | Department | Employee | Salary |
-- +------------+----------+--------+
-- | IT         | Max      | 90000  |
-- | IT         | Jim      | 90000  |
-- | Sales      | Henry    | 80000  |
-- +------------+----------+--------+
-- Explanation:

-- Max and Jim both have the highest salary in the IT department and Henry has the highest salary in the Sales department.

-- ======= Solution
==========

```
select a.Department, a.Employee, a.Salary
from(
select d.name as Department, e.name as Employee, Salary,
rank() over(partition by d.name order by salary desc) as rk
from employee e
join department d
on e.departmentid = d.id) a
where a.rk=1
```

-- ##########################################################################
-- Question 78
-- Table Variables:

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | name          | varchar |
-- | value         | int     |
-- +---------------+---------+
-- name is the primary key for this table.
-- This table contains the stored variables and their values.

-- Table Expressions:

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | left_operand  | varchar |

-- | operator      | enum    |
-- | right_operand | varchar |
-- +---------------+---------+
-- (left_operand, operator, right_operand) is the primary key for this table.
-- This table contains a boolean expression that should be evaluated.
-- operator is an enum that takes one of the values ('<', '>', '=')
-- The values of left_operand and right_operand are guaranteed to be in the Variables table.


-- Write an SQL query to evaluate the boolean expressions in Expressions table.

-- Return the result table in any order.

-- The query result format is in the following example.

-- Variables table:
-- +------+-------+
-- | name | value |
-- +------+-------+
-- | x    | 66    |
-- | y    | 77    |
-- +------+-------+

-- Expressions table:
-- +--------------+----------+---------------+
-- | left_operand | operator | right_operand |
-- +--------------+----------+---------------+
-- | x            | >        | y             |
-- | x            | <        | y             |
-- | x            | =        | y             |
-- | y            | >        | x             |
-- | y            | <        | x             |
-- | x            | =        | x             |
-- +--------------+----------+---------------+

-- Result table:
-- +--------------+----------+---------------+-------+
-- | left_operand | operator | right_operand | value |
-- +--------------+----------+---------------+-------+
-- | x            | >        | y             | false |
-- | x            | <        | y             | true  |
-- | x            | =        | y             | false |
-- | y            | >        | x             | true  |
-- | y            | <        | x             | false |
-- | x            | =        | x             | true  |
-- +--------------+----------+---------------+-------+
-- As shown, you need find the value of each boolean exprssion in the table using the variables table.

-- ======= Solution
==========

```
with t1 as(
select e.left_operand, e.operator, e.right_operand, v.value as left_val, v_1.value as right_val
from expressions e
join variables v
on v.name = e.left_operand
join variables v_1
on v_1.name = e.right_operand)

select t1.left_operand, t1.operator, t1.right_operand,
case when t1.operator = '<' then (select t1.left_val< t1.right_val)
when t1.operator = '>' then (select t1.left_val > t1.right_val)
when t1.operator = '=' then (select t1.left_val = t1.right_val)
else FALSE
END AS VALUE
from t1
```

```
-- ##########################################################################
-- Question 56
-- Mary is a teacher in a middle school and she has a table seat storing students' names and their corresponding seat ids.

-- The column id is continuous increment.


-- Mary wants to change seats for the adjacent students.


-- Can you write a SQL query to output the result for Mary?


-- +---------+---------+
-- |    id   | student |
-- +---------+---------+
-- |    1    | Abbot   |
-- |    2    | Doris   |
-- |    3    | Emerson |
-- |    4    | Green   |
-- |    5    | Jeames  |
-- +---------+---------+
-- For the sample input, the output is:


-- +---------+---------+
-- |    id   | student |
-- +---------+---------+
-- |    1    | Doris   |
-- |    2    | Abbot   |
-- |    3    | Green   |
-- |    4    | Emerson |
-- |    5    | Jeames  |
-- +---------+---------+
```

-- ======= Solution
==========

```
select row_number() over (order by (if(id%2=1,id+1,id-1))) as id, student
from seat
```

```
 -- ##########################################################################
 -- Question 80
-- Table: Logs

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | log_id        | int     |
-- +---------------+---------+
-- id is the primary key for this table.
-- Each row of this table contains the ID in a log Table.

-- Since some IDs have been removed from Logs. Write an SQL query to find the start and end number of continuous ranges in table Logs.

-- Order the result table by start_id.

-- The query result format is in the following example:

-- Logs table:
-- +------------+
-- | log_id     |
-- +------------+
-- | 1          |
-- | 2          |
-- | 3          |
-- | 7          |
-- | 8          |
-- | 10         |
-- +------------+

-- Result table:
-- +------------+--------------+
-- | start_id   | end_id       |
-- +------------+--------------+
-- | 1          | 3            |
-- | 7          | 8            |
-- | 10         | 10           |
-- +------------+--------------+
-- The result table should contain all ranges in table Logs.
-- From 1 to 3 is contained in the table.
-- From 4 to 6 is missing in the table
-- From 7 to 8 is contained in the table.
-- Number 9 is missing in the table.
```

-- Number 10 is contained in the table.

-- ======= Solution
==========

```
select min(log_id) as start_id, max(log_id) as end_id
from(
select log_id, log_id-row_number() over (order by log_id) as rk
from logs) a
group by rk
```

-- ##########
-- Question 60
-- In social network like Facebook or Twitter, people send friend requests and accept others' requests as well.

-- Table request_accepted

```
-- +--------------+-------------+------------+
-- | requester_id | accepter_id | accept_date|
-- |--------------|-------------|------------|
-- | 1            | 2           | 2016_06-03 |
-- | 1            | 3           | 2016-06-08 |
-- | 2            | 3           | 2016-06-08 |
-- | 3            | 4           | 2016-06-09 |
-- +--------------+-------------+------------+
```

-- This table holds the data of friend acceptance, while requester_id and accepter_id both are the id of a person.

-- Write a query to find the the people who has most friends and the most friends number under the following rules:

-- It is guaranteed there is only 1 people having the most friends.
-- The friend request could only been accepted once, which mean there is no multiple records with the same requester_id and accepter_id value.
-- For the sample data above, the result is:

-- Result table:

```
-- +------+------+
-- | id   | num  |
-- |------|------|
-- | 3    | 3    |
-- +------+------+
```

-- The person with id '3' is a friend of people '1', '2' and '4', so he has 3 friends in total, which is the most number than any others.

-- ======= Solution
==========

```
select requester_id as id, b.total as num
from(
select requester_id, sum(one) as total
from((
```

```
select requester_id, count(distinct accepter_id) as one
from request_accepted
group by requester_id)
union all
(select accepter_id, count(distinct requester_id) as two
from request_accepted
group by accepter_id)) a
group by requester_id
order by total desc) b
limit 1

 -- ##########################################################################
 -- Question 62
-- Table: Activity

-- +--------------+---------+
-- | Column Name  | Type    |
-- +--------------+---------+
-- | player_id    | int     |
-- | device_id    | int     |
-- | event_date   | date    |
-- | games_played | int     |
-- +--------------+---------+
-- (player_id, event_date) is the primary key of this table.
-- This table shows the activity of players of some game.
-- Each row is a record of a player who logged in and played a number of games (possibly 0) before logging out on some day using some device.


-- Write an SQL query that reports for each player and date, how many games played so far by the player. That is, the total number of games played by the player until that date. Check the example for clarity.

-- The query result format is in the following example:

-- Activity table:
-- +-----------+-----------+------------+--------------+
-- | player_id | device_id | event_date | games_played |
-- +-----------+-----------+------------+--------------+
-- | 1         | 2         | 2016-03-01 | 5            |
-- | 1         | 2         | 2016-05-02 | 6            |
-- | 1         | 3         | 2017-06-25 | 1            |
-- | 3         | 1         | 2016-03-02 | 0            |
-- | 3         | 4         | 2018-07-03 | 5            |
-- +-----------+-----------+------------+--------------+

-- Result table:
-- +-----------+------------+---------------------+
-- | player_id | event_date | games_played_so_far |
-- +-----------+------------+---------------------+
-- | 1         | 2016-03-01 | 5                   |
-- | 1         | 2016-05-02 | 11                  |
```

```
-- | 1       | 2017-06-25 | 12              |
-- | 3       | 2016-03-02 | 0               |
-- | 3       | 2018-07-03 | 5               |
-- +-----------+------------+---------------------+
-- For the player with id 1, 5 + 6 = 11 games played by 2016-05-02, and 5 + 6 + 1 = 12 games played by 2017-06-25.
-- For the player with id 3, 0 + 5 = 5 games played by 2018-07-03.
-- Note that for each player we only care about the days when the player logged in.

-- ======= Solution
================================================================================

select player_id, event_date,
sum(games_played) over(partition by player_id order by event_date) as games_played_so_far
from activity
order by 1,2

 -- ########################################################################
 -- Question 91
-- Table: Activity

-- +--------------+---------+
-- | Column Name  | Type    |
-- +--------------+---------+
-- | player_id    | int     |
-- | device_id    | int     |
-- | event_date   | date    |
-- | games_played | int     |
-- +--------------+---------+
-- (player_id, event_date) is the primary key of this table.
-- This table shows the activity of players of some game.
-- Each row is a record of a player who logged in and played a number of games (possibly 0)
-- before logging out on some day using some device.


-- Write an SQL query that reports the fraction of players that logged in again
-- on the day after the day they first logged in, rounded to 2 decimal places.
-- In other words, you need to count the number of players that logged in for at least two consecutive
-- days starting from their first login date, then divide that number by the total number of players.

-- The query result format is in the following example:

-- Activity table:
-- +-----------+-----------+------------+--------------+
-- | player_id | device_id | event_date | games_played |
-- +-----------+-----------+------------+--------------+
-- | 1       | 2       | 2016-03-01 | 5          |
-- | 1       | 2       | 2016-03-02 | 6          |
-- | 2       | 3       | 2017-06-25 | 1          |
-- | 3       | 1       | 2016-03-02 | 0          |
-- | 3       | 4       | 2018-07-03 | 5          |
-- +-----------+-----------+------------+--------------+
```

```
-- Result table:
-- +-----------+
-- | fraction  |
-- +-----------+
-- | 0.33      |
-- +-----------+
-- Only the player with id 1 logged back in after the first day he had logged in so the answer is 1/3 = 0.33

-- ======= Solution
================================================================================

With t as
(select player_id,
 min(event_date) over(partition by player_id) as min_event_date,
 case when event_date- min(event_date) over(partition by player_id) = 1 then 1
 else 0
 end as s
 from Activity)

select round(sum(t.s)/count(distinct t.player_id),2) as fraction
from t

 -- ######################################################################
 -- Question 86
-- Get the highest answer rate question from a table survey_log with these columns: id, action, question_id, answer_id,
q_num, timestamp.

-- id means user id; action has these kind of values: "show", "answer", "skip"; answer_id is not null when action column
is "answer",
-- while is null for "show" and "skip"; q_num is the numeral order of the question in current session.

-- Write a sql query to identify the question which has the highest answer rate.

-- Example:

-- Input:
-- +------+-----------+--------------+------------+-----------+------------+
-- | id   | action    | question_id  | answer_id  | q_num     | timestamp  |
-- +------+-----------+--------------+------------+-----------+------------+
-- | 5    | show      | 285          | null       | 1         | 123        |
-- | 5    | answer    | 285          | 124124     | 1         | 124        |
-- | 5    | show      | 369          | null       | 2         | 125        |
-- | 5    | skip      | 369          | null       | 2         | 126        |
-- +------+-----------+--------------+------------+-----------+------------+
-- Output:
-- +-------------+
-- | survey_log  |
-- +-------------+
-- |    285      |
-- +-------------+
```

-- Explanation:
-- question 285 has answer rate 1/1, while question 369 has 0/1 answer rate, so output 285.


-- Note: The highest answer rate meaning is: answer number's ratio in show number in the same question.

-- ======= Solution
==========

```
with t1 as(
select a.question_id, coalesce(b.answer/a.show_1,0) as rate
from
(select question_id, coalesce(count(*),0) as show_1
from survey_log
where action != 'answer'
group by question_id) a
left join
(select question_id, coalesce(count(*),0) as answer
from survey_log
where action = 'answer'
group by question_id) b
on a.question_id = b.question_id)

select a.question_id as survey_log
from
( select t1.question_id,
rank() over(order by rate desc) as rk
from t1) a
where a.rk = 1
```

-- ##########################################################################
-- Question 109
-- Table: UserActivity

```
-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | username      | varchar |
-- | activity      | varchar |
-- | startDate     | Date    |
-- | endDate       | Date    |
-- +---------------+---------+
```
-- This table does not contain primary key.
-- This table contain information about the activity performed of each user in a period of time.
-- A person with username performed a activity from startDate to endDate.

-- Write an SQL query to show the second most recent activity of each user.

-- If the user only has one activity, return that one.

-- A user can't perform more than one activity at the same time. Return the result table in any order.

-- The query result format is in the following example:

-- UserActivity table:
-- +------------+--------------+-------------+-------------+
-- | username   | activity     | startDate   | endDate     |
-- +------------+--------------+-------------+-------------+
-- | Alice      | Travel       | 2020-02-12  | 2020-02-20  |
-- | Alice      | Dancing      | 2020-02-21  | 2020-02-23  |
-- | Alice      | Travel       | 2020-02-24  | 2020-02-28  |
-- | Bob        | Travel       | 2020-02-11  | 2020-02-18  |
-- +------------+--------------+-------------+-------------+

-- Result table:
-- +------------+--------------+-------------+-------------+
-- | username   | activity     | startDate   | endDate     |
-- +------------+--------------+-------------+-------------+
-- | Alice      | Dancing      | 2020-02-21  | 2020-02-23  |
-- | Bob        | Travel       | 2020-02-11  | 2020-02-18  |
-- +------------+--------------+-------------+-------------+

-- The most recent activity of Alice is Travel from 2020-02-24 to 2020-02-28, before that she was dancing from 2020-02-21 to 2020-02-23.
-- Bob only has one record, we just take that one.

-- ======= Solution
==========

```
select username, activity, startdate, enddate
from
(select *,
rank() over(partition by username order by startdate desc) as rk,
count(username) over(partition by username) as cnt
from useractivity) a
where a.rk = 2 or cnt = 1
```

-- ##########################################################################
-- Question 63
-- Table: Enrollments

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | student_id    | int     |
-- | course_id     | int     |
-- | grade         | int     |
-- +---------------+---------+
-- (student_id, course_id) is the primary key of this table.

-- Write a SQL query to find the highest grade with its corresponding course for each student. In case of a tie, you should find the course with the smallest course_id. The output must be sorted by increasing student_id.

-- The query result format is in the following example:

-- Enrollments table:
-- +------------+------------------+
-- | student_id | course_id | grade |
-- +------------+-----------+-------+
-- | 2 | 2 | 95 |
-- | 2 | 3 | 95 |
-- | 1 | 1 | 90 |
-- | 1 | 2 | 99 |
-- | 3 | 1 | 80 |
-- | 3 | 2 | 75 |
-- | 3 | 3 | 82 |
-- +------------+-----------+-------+

-- Result table:
-- +------------+------------------+
-- | student_id | course_id | grade |
-- +------------+-----------+-------+
-- | 1 | 2 | 99 |
-- | 2 | 2 | 95 |
-- | 3 | 3 | 82 |
-- +------------+-----------+-------+

-- ======= Solution
==========

```
select student_id, course_id, grade
from(
select student_id, course_id, grade,
rank() over(partition by student_id order by grade desc, course_id) as rk
from enrollments) a
where a.rk = 1
```

-- ##########
-- Question 82
-- Table: Delivery

-- +-----------------------------+---------+
-- | Column Name | Type |
-- +-----------------------------+---------+
-- | delivery_id | int |
-- | customer_id | int |
-- | order_date | date |
-- | customer_pref_delivery_date | date |
-- +-----------------------------+---------+
-- delivery_id is the primary key of this table.

-- The table holds information about food delivery to customers that make orders at some date and specify a preferred delivery date (on the same order date or after it).

-- If the preferred delivery date of the customer is the same as the order date then the order is called immediate otherwise it's called scheduled.

-- The first order of a customer is the order with the earliest order date that customer made. It is guaranteed that a customer has exactly one first order.

-- Write an SQL query to find the percentage of immediate orders in the first orders of all customers, rounded to 2 decimal places.

-- The query result format is in the following example:

-- Delivery table:
-- +-------------+-------------+------------+----------------------------+
-- | delivery_id | customer_id | order_date | customer_pref_delivery_date |
-- +-------------+-------------+------------+----------------------------+
-- | 1 | 1 | 2019-08-01 | 2019-08-02 |
-- | 2 | 2 | 2019-08-02 | 2019-08-02 |
-- | 3 | 1 | 2019-08-11 | 2019-08-12 |
-- | 4 | 3 | 2019-08-24 | 2019-08-24 |
-- | 5 | 3 | 2019-08-21 | 2019-08-22 |
-- | 6 | 2 | 2019-08-11 | 2019-08-13 |
-- | 7 | 4 | 2019-08-09 | 2019-08-09 |
-- +-------------+-------------+------------+----------------------------+

-- Result table:
-- +----------------------+
-- | immediate_percentage |
-- +----------------------+
-- | 50.00 |
-- +----------------------+
-- The customer id 1 has a first order with delivery id 1 and it is scheduled.
-- The customer id 2 has a first order with delivery id 2 and it is immediate.
-- The customer id 3 has a first order with delivery id 5 and it is scheduled.
-- The customer id 4 has a first order with delivery id 7 and it is immediate.
-- Hence, half the customers have immediate first orders.

-- ======= Solution
==========

```
select
round(avg(case when order_date = customer_pref_delivery_date then 1 else 0 end)*100,2) as
immediate_percentage
from
(select *,
 rank() over(partition by customer_id order by order_date) as rk
from delivery) a
where a.rk=1
```

-- ######################################################################
-- Question 96
-- Write a query to print the sum of all total investment values in 2016 (TIV_2016), to a scale of 2 decimal places, for all policy holders who meet the following criteria:

-- Have the same TIV_2015 value as one or more other policyholders.
-- Are not located in the same city as any other policyholder (i.e.: the (latitude, longitude) attribute pairs must be unique).
-- Input Format:
-- The insurance table is described as follows:

-- | Column Name | Type |
-- |-------------|---------------|
-- | PID | INTEGER(11) |
-- | TIV_2015 | NUMERIC(15,2) |
-- | TIV_2016 | NUMERIC(15,2) |
-- | LAT | NUMERIC(5,2) |
-- | LON | NUMERIC(5,2) |
-- where PID is the policyholder's policy ID, TIV_2015 is the total investment value in 2015, TIV_2016 is the total investment value in 2016, LAT is the latitude of the policy holder's city, and LON is the longitude of the policy holder's city.

-- Sample Input

-- | PID | TIV_2015 | TIV_2016 | LAT | LON |
-- |-----|----------|----------|-----|-----|
-- | 1 | 10 | 5 | 10 | 10 |
-- | 2 | 20 | 20 | 20 | 20 |
-- | 3 | 10 | 30 | 20 | 20 |
-- | 4 | 10 | 40 | 40 | 40 |
-- Sample Output

-- | TIV_2016 |
-- |----------|
-- | 45.00 |
-- Explanation

-- The first record in the table, like the last record, meets both of the two criteria.
-- The TIV_2015 value '10' is as the same as the third and forth record, and its location unique.

-- The second record does not meet any of the two criteria. Its TIV_2015 is not like any other policyholders.

-- And its location is the same with the third record, which makes the third record fail, too.

-- So, the result is the sum of TIV_2016 of the first and last record, which is 45.

-- ======= Solution
==========

select sum(TIV_2016) TIV_2016

```
from
(select *, count(*) over (partition by TIV_2015) as c1, count(*) over (partition by LAT, LON) as c2
from insurance ) t
where c1 > 1 and c2 = 1;

 -- ##########################################################################
 -- Question 68
-- Table: Queue

-- +-------------+---------+
-- | Column Name | Type    |
-- +-------------+---------+
-- | person_id   | int     |
-- | person_name | varchar |
-- | weight      | int     |
-- | turn        | int     |
-- +-------------+---------+
-- person_id is the primary key column for this table.
-- This table has the information about all people waiting for an elevator.
-- The person_id and turn columns will contain all numbers from 1 to n, where n is the number of rows in the table.


-- The maximum weight the elevator can hold is 1000.

-- Write an SQL query to find the person_name of the last person who will fit in the elevator without exceeding the weight limit. It is guaranteed that the person who is first in the queue can fit in the elevator.

-- The query result format is in the following example:

-- Queue table
-- +-----------+-------------------+--------+------+
-- | person_id | person_name       | weight | turn |
-- +-----------+-------------------+--------+------+
-- | 5         | George Washington | 250    | 1    |
-- | 3         | John Adams        | 350    | 2    |
-- | 6         | Thomas Jefferson  | 400    | 3    |
-- | 2         | Will Johnliams    | 200    | 4    |
-- | 4         | Thomas Jefferson  | 175    | 5    |
-- | 1         | James Elephant    | 500    | 6    |
-- +-----------+-------------------+--------+------+

-- Result table
-- +-------------------+
-- | person_name       |
-- +-------------------+
-- | Thomas Jefferson  |
-- +-------------------+

-- Queue table is ordered by turn in the example for simplicity.
-- In the example George Washington(id 5), John Adams(id 3) and Thomas Jefferson(id 6) will enter the elevator as their weight sum is 250 + 350 + 400 = 1000.
```

-- Thomas Jefferson(id 6) is the last person to fit in the elevator because he has the last turn in these three people.
-- ======= Solution
==========

```
With t1 as
(
select *,
sum(weight) over(order by turn) as cum_weight
from queue
order by turn)

select t1.person_name
from t1
where turn = (select max(turn) from t1 where t1.cum_weight<=1000)
```

-- ######################################################################
-- Question 75
-- The Employee table holds all employees including their managers. Every employee has an Id, and there is also a column for the manager Id.

```
-- +------+----------+-----------+----------+
-- |Id    |Name      |Department |ManagerId |
-- +------+----------+-----------+----------+
-- |101   |John      |A          |null      |
-- |102   |Dan       |A          |101       |
-- |103   |James             |A          |101       |
-- |104   |Amy       |A          |101       |
-- |105   |Anne      |A          |101       |
-- |106   |Ron       |B          |101       |
-- +------+----------+-----------+----------+
```

-- Given the Employee table, write a SQL query that finds out managers with at least 5 direct report. For the above table, your SQL query should return:

```
-- +-------+
-- | Name  |
-- +-------+
-- | John  |
-- +-------+
```

-- Note:
-- No one would report to himself.

-- ======= Solution
==========

```
with t1 as
(
   select managerid, count(name) as total
   from employee
   group by managerid
```

)

select e.name
from t1
join employee e
on t1.managerid = e.id
where t1.total>=5

-- ##########################################################################
-- Question 69
-- Table: Users

-- +----------------+---------+
-- | Column Name    | Type    |
-- +----------------+---------+
-- | user_id        | int     |
-- | join_date      | date    |
-- | favorite_brand | varchar |
-- +----------------+---------+
-- user_id is the primary key of this table.
-- This table has the info of the users of an online shopping website where users can sell and buy items.
-- Table: Orders

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | order_id      | int     |
-- | order_date    | date    |
-- | item_id       | int     |
-- | buyer_id      | int     |
-- | seller_id     | int     |
-- +---------------+---------+
-- order_id is the primary key of this table.
-- item_id is a foreign key to the Items table.
-- buyer_id and seller_id are foreign keys to the Users table.
-- Table: Items

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | item_id       | int     |
-- | item_brand    | varchar |
-- +---------------+---------+
-- item_id is the primary key of this table.


-- Write an SQL query to find for each user, the join date and the number of orders they made as a buyer in 2019.

-- The query result format is in the following example:

-- Users table:

```
-- +---------+------------+----------------+
-- | user_id | join_date  | favorite_brand |
-- +---------+------------+----------------+
-- | 1       | 2018-01-01 | Lenovo         |
-- | 2       | 2018-02-09 | Samsung        |
-- | 3       | 2018-01-19 | LG             |
-- | 4       | 2018-05-21 | HP             |
-- +---------+------------+----------------+

-- Orders table:
-- +----------+------------+---------+----------+-----------+
-- | order_id | order_date | item_id | buyer_id | seller_id |
-- +----------+------------+---------+----------+-----------+
-- | 1        | 2019-08-01 | 4       | 1        | 2         |
-- | 2        | 2018-08-02 | 2       | 1        | 3         |
-- | 3        | 2019-08-03 | 3       | 2        | 3         |
-- | 4        | 2018-08-04 | 1       | 4        | 2         |
-- | 5        | 2018-08-04 | 1       | 3        | 4         |
-- | 6        | 2019-08-05 | 2       | 2        | 4         |
-- +----------+------------+---------+----------+-----------+

-- Items table:
-- +---------+------------+
-- | item_id | item_brand |
-- +---------+------------+
-- | 1       | Samsung    |
-- | 2       | Lenovo     |
-- | 3       | LG         |
-- | 4       | HP         |
-- +---------+------------+

-- Result table:
-- +------------+------------+----------------+
-- | buyer_id   | join_date  | orders_in_2019 |
-- +------------+------------+----------------+
-- | 1          | 2018-01-01 | 1              |
-- | 2          | 2018-02-09 | 2              |
-- | 3          | 2018-01-19 | 0              |
-- | 4          | 2018-05-21 | 0              |
-- +------------+------------+----------------+

-- ======= Solution
================================================================================

select user_id as buyer_id, join_date, coalesce(a.orders_in_2019,0)
from users
left join
(
select buyer_id, coalesce(count(*), 0) as orders_in_2019
from orders o
join users u
```

```
on u.user_id = o.buyer_id
where extract('year'from order_date) = 2019
group by buyer_id) a
on users.user_id = a.buyer_id

 -- ##########################################################################
 -- Question 95
-- Table: Transactions

-- +----------------+---------+
-- | Column Name    | Type    |
-- +----------------+---------+
-- | id             | int     |
-- | country        | varchar |
-- | state          | enum    |
-- | amount         | int     |
-- | trans_date     | date    |
-- +----------------+---------+
-- id is the primary key of this table.
-- The table has information about incoming transactions.
-- The state column is an enum of type ["approved", "declined"].
-- Table: Chargebacks

-- +----------------+---------+
-- | Column Name    | Type    |
-- +----------------+---------+
-- | trans_id       | int     |
-- | charge_date    | date    |
-- +----------------+---------+
-- Chargebacks contains basic information regarding incoming chargebacks from some transactions placed in
Transactions table.
-- trans_id is a foreign key to the id column of Transactions table.
-- Each chargeback corresponds to a transaction made previously even if they were not approved.


-- Write an SQL query to find for each month and country, the number of approved transactions and their total amount,
the number of chargebacks and their total amount.

-- Note: In your query, given the month and country, ignore rows with all zeros.

-- The query result format is in the following example:

-- Transactions table:
-- +------+---------+----------+--------+------------+
-- | id   | country | state    | amount | trans_date |
-- +------+---------+----------+--------+------------+
-- | 101  | US      | approved | 1000   | 2019-05-18 |
-- | 102  | US      | declined | 2000   | 2019-05-19 |
-- | 103  | US      | approved | 3000   | 2019-06-10 |
-- | 104  | US      | approved | 4000   | 2019-06-13 |
-- | 105  | US      | approved | 5000   | 2019-06-15 |
```

```
-- +------+---------+----------+--------+------------+

-- Chargebacks table:
-- +------------+------------+
-- | trans_id   | trans_date |
-- +------------+------------+
-- | 102        | 2019-05-29 |
-- | 101        | 2019-06-30 |
-- | 105        | 2019-09-18 |
-- +------------+------------+

-- Result table:
-- +----------+---------+----------------+-----------------+------------------+--------------------+
-- | month    | country | approved_count | approved_amount | chargeback_count  | chargeback_amount  |
-- +----------+---------+----------------+-----------------+------------------+--------------------+
-- | 2019-05  | US      | 1              | 1000            | 1                | 2000               |
-- | 2019-06  | US      | 3              | 12000           | 1                | 1000               |
-- | 2019-09  | US      | 0              | 0               | 1                | 5000               |
-- +----------+---------+----------------+-----------------+------------------+--------------------+

-- ======= Solution
================================================================================

with t1 as
(select country, extract('month' from trans_date), state, count(*) as approved_count, sum(amount) as
approved_amount
from transactions
where state = 'approved'
group by 1, 2, 3),
t2 as(
select t.country, extract('month' from c.trans_date), sum(amount) as chargeback_amount, count(*) as
chargeback_count
from chargebacks c left join transactions t
on trans_id = id
group by t.country, extract('month' from c.trans_date)),

t3 as(
select t2.date_part, t2.country, coalesce(approved_count,0) as approved_count, coalesce(approved_amount,0) as
approved_amount, coalesce(chargeback_count,0) as chargeback_count, coalesce(chargeback_amount,0) as
chargeback_amount
from t2 left join t1
on t2.date_part = t1.date_part and t2.country = t1.country),

t4 as(
select t1.date_part, t1.country, coalesce(approved_count,0) as approved_count, coalesce(approved_amount,0) as
approved_amount, coalesce(chargeback_count,0) as chargeback_count, coalesce(chargeback_amount,0) as
chargeback_amount
from t2 right join t1
on t2.date_part = t1.date_part and t2.country = t1.country)

select *
```

```
from t3
union
select *
from t4

 -- ##########################################################################
 -- Question 83
-- Table: Transactions

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | id            | int     |
-- | country       | varchar |
-- | state         | enum    |
-- | amount        | int     |
-- | trans_date    | date    |
-- +---------------+---------+
-- id is the primary key of this table.
-- The table has information about incoming transactions.
-- The state column is an enum of type ["approved", "declined"].


-- Write an SQL query to find for each month and country, the number of transactions and their total amount, the number of approved transactions and their total amount.

-- The query result format is in the following example:

-- Transactions table:
-- +------+---------+----------+--------+------------+
-- | id   | country | state    | amount | trans_date |
-- +------+---------+----------+--------+------------+
-- | 121  | US      | approved | 1000   | 2018-12-18 |
-- | 122  | US      | declined | 2000   | 2018-12-19 |
-- | 123  | US      | approved | 2000   | 2019-01-01 |
-- | 124  | DE      | approved | 2000   | 2019-01-07 |
-- +------+---------+----------+--------+------------+

-- Result table:
-- +----------+---------+-------------+---------------+-------------------+-----------------------+
-- | month    | country | trans_count | approved_count | trans_total_amount | approved_total_amount |
-- +----------+---------+-------------+---------------+-------------------+-----------------------+
-- | 2018-12  | US      | 2           | 1             | 3000              | 1000                  |
-- | 2019-01  | US      | 1           | 1             | 2000              | 2000                  |
-- | 2019-01  | DE      | 1           | 1             | 2000              | 2000                  |
-- +----------+---------+-------------+---------------+-------------------+-----------------------+

-- ======= Solution
================================================================================

with t1 as(
```

```
select DATE_FORMAT(trans_date,'%Y-%m') as month, country, count(state) as trans_count, sum(amount) as
trans_total_amount
from transactions
group by country, month(trans_date)),

t2 as (
Select DATE_FORMAT(trans_date,'%Y-%m') as month, country, count(state) as approved_count, sum(amount) as
approved_total_amount
from transactions
where state = 'approved'
group by country, month(trans_date))

select t1.month, t1.country, coalesce(t1.trans_count,0) as trans_count, coalesce(t2.approved_count,0) as
approved_count, coalesce(t1.trans_total_amount,0) as trans_total_amount, coalesce(t2.approved_total_amount,0) as
approved_total_amount
from t1 left join t2
on t1.country = t2.country and t1.month = t2.month

 -- ##########################################################################
 -- Question 59
-- Table: Movies

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | movie_id      | int     |
-- | title         | varchar |
-- +---------------+---------+
-- movie_id is the primary key for this table.
-- title is the name of the movie.
-- Table: Users

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | user_id       | int     |
-- | name          | varchar |
-- +---------------+---------+
-- user_id is the primary key for this table.
-- Table: Movie_Rating

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | movie_id      | int     |
-- | user_id       | int     |
-- | rating        | int     |
-- | created_at    | date    |
-- +---------------+---------+
-- (movie_id, user_id) is the primary key for this table.
-- This table contains the rating of a movie by a user in their review.
```

-- created_at is the user's review date.

-- Write the following SQL query:

-- Find the name of the user who has rated the greatest number of the movies.
-- In case of a tie, return lexicographically smaller user name.

-- Find the movie name with the highest average rating in February 2020.
-- In case of a tie, return lexicographically smaller movie name.

-- Query is returned in 2 rows, the query result format is in the folowing example:

-- Movies table:
-- +-------------+--------------+
-- | movie_id    |  title       |
-- +-------------+--------------+
-- | 1           | Avengers     |
-- | 2           | Frozen 2     |
-- | 3           | Joker        |
-- +-------------+--------------+

-- Users table:
-- +-------------+--------------+
-- | user_id     |  name        |
-- +-------------+--------------+
-- | 1           | Daniel       |
-- | 2           | Monica       |
-- | 3           | Maria        |
-- | 4           | James        |
-- +-------------+--------------+

-- Movie_Rating table:
-- +-------------+--------------+--------------+-------------+
-- | movie_id    | user_id      | rating       | created_at  |
-- +-------------+--------------+--------------+-------------+
-- | 1           | 1            | 3            | 2020-01-12  |
-- | 1           | 2            | 4            | 2020-02-11  |
-- | 1           | 3            | 2            | 2020-02-12  |
-- | 1           | 4            | 1            | 2020-01-01  |
-- | 2           | 1            | 5            | 2020-02-17  |
-- | 2           | 2            | 2            | 2020-02-01  |
-- | 2           | 3            | 2            | 2020-03-01  |
-- | 3           | 1            | 3            | 2020-02-22  |
-- | 3           | 2            | 4            | 2020-02-25  |
-- +-------------+--------------+--------------+-------------+

-- Result table:
-- +--------------+
-- | results      |
-- +--------------+

-- | Daniel |
-- | Frozen 2 |
-- +----------+

-- Daniel and Maria have rated 3 movies ("Avengers", "Frozen 2" and "Joker") but Daniel is smaller lexicographically.
-- Frozen 2 and Joker have a rating average of 3.5 in February but Frozen 2 is smaller lexicographically.

-- ======= Solution
==========

```
select name as results
from(
(select a.name
from(
select name, count(*),
rank() over(order by count(*) desc) as rk
from movie_rating m
join users u
on m.user_id = u.user_id
group by name, m.user_id
order by rk, name) a
limit 1)
union
(select title
from(
select title, round(avg(rating),1) as rnd
from movie_rating m
join movies u
on m.movie_id = u.movie_id
where month(created_at) = 2
group by title
order by rnd desc, title) b
limit 1)) as d
```

-- ##########
-- Question 92
-- Table: Traffic

-- +---------------+---------+
-- | Column Name | Type |
-- +---------------+---------+
-- | user_id | int |
-- | activity | enum |
-- | activity_date | date |
-- +---------------+---------+
-- There is no primary key for this table, it may have duplicate rows.
-- The activity column is an ENUM type of ('login', 'logout', 'jobs', 'groups', 'homepage').

-- Write an SQL query that reports for every date within at most 90 days from today,
-- the number of users that logged in for the first time on that date. Assume today is 2019-06-30.

```
-- The query result format is in the following example:

-- Traffic table:
-- +---------+----------+---------------+
-- | user_id | activity | activity_date |
-- +---------+----------+---------------+
-- | 1       | login    | 2019-05-01    |
-- | 1       | homepage | 2019-05-01    |
-- | 1       | logout   | 2019-05-01    |
-- | 2       | login    | 2019-06-21    |
-- | 2       | logout   | 2019-06-21    |
-- | 3       | login    | 2019-01-01    |
-- | 3       | jobs     | 2019-01-01    |
-- | 3       | logout   | 2019-01-01    |
-- | 4       | login    | 2019-06-21    |
-- | 4       | groups   | 2019-06-21    |
-- | 4       | logout   | 2019-06-21    |
-- | 5       | login    | 2019-03-01    |
-- | 5       | logout   | 2019-03-01    |
-- | 5       | login    | 2019-06-21    |
-- | 5       | logout   | 2019-06-21    |
-- +---------+----------+---------------+

-- Result table:
-- +------------+-------------+
-- | login_date | user_count  |
-- +------------+-------------+
-- | 2019-05-01 | 1           |
-- | 2019-06-21 | 2           |
-- +------------+-------------+
-- Note that we only care about dates with non zero user count.
-- The user with id 5 first logged in on 2019-03-01 so he's not counted on 2019-06-21.

-- ======= Solution
================================================================================

with t1 as
(
   select user_id, min(activity_date) as login_date
   from Traffic
   where activity = 'login'
   group by user_id
)

select login_date, count(distinct user_id) as user_count
from t1
where login_date between '2019-04-01' and '2019-06-30'
group by login_date

 -- ######################################################################
```

-- Question 54
-- Table: NPV

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | id            | int     |
-- | year          | int     |
-- | npv           | int     |
-- +---------------+---------+
-- (id, year) is the primary key of this table.
-- The table has information about the id and the year of each inventory and the corresponding net present value.


-- Table: Queries

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | id            | int     |
-- | year          | int     |
-- +---------------+---------+
-- (id, year) is the primary key of this table.
-- The table has information about the id and the year of each inventory query.


-- Write an SQL query to find the npv of all each query of queries table.

-- Return the result table in any order.

-- The query result format is in the following example:

-- NPV table:
-- +------+--------+--------+
-- | id   | year   | npv    |
-- +------+--------+--------+
-- | 1    | 2018   | 100    |
-- | 7    | 2020   | 30     |
-- | 13   | 2019   | 40     |
-- | 1    | 2019   | 113    |
-- | 2    | 2008   | 121    |
-- | 3    | 2009   | 12     |
-- | 11   | 2020   | 99     |
-- | 7    | 2019   | 0      |
-- +------+--------+--------+

-- Queries table:
-- +------+--------+
-- | id   | year   |
-- +------+--------+
-- | 1    | 2019   |

```
-- | 2    | 2008   |
-- | 3    | 2009   |
-- | 7    | 2018   |
-- | 7    | 2019   |
-- | 7    | 2020   |
-- | 13   | 2019   |
-- +------+--------+

-- Result table:
-- +------+--------+--------+
-- | id   | year   | npv    |
-- +------+--------+--------+
-- | 1    | 2019   | 113    |
-- | 2    | 2008   | 121    |
-- | 3    | 2009   | 12     |
-- | 7    | 2018   | 0      |
-- | 7    | 2019   | 0      |
-- | 7    | 2020   | 30     |
-- | 13   | 2019   | 40     |
-- +------+--------+--------+

-- The npv value of (7, 2018) is not present in the NPV table, we consider it 0.
-- The npv values of all other queries can be found in the NPV table.

-- ======= Solution
================================================================================

select q.id, q.year, coalesce(n.npv,0) as npv
from queries q
left join npv n
on q.id = n.id and q.year=n.year


 -- ########################################################################
 -- Question 50
-- Write a SQL query to get the nth highest salary from the Employee table.

-- +----+--------+
-- | Id | Salary |
-- +----+--------+
-- | 1  | 100    |
-- | 2  | 200    |
-- | 3  | 300    |
-- +----+--------+
-- For example, given the above Employee table, the nth highest salary where n = 2 is 200. If there is no nth highest salary, then the query should return null.

-- +------------------------+
-- | getNthHighestSalary(2) |
-- +------------------------+
-- | 200                    |
```

```
-- +-----------------------+

-- ======= Solution
================================================================================

CREATE FUNCTION getNthHighestSalary(N INT) RETURNS INT
BEGIN
  RETURN (
     # Write your MySQL query statement below.
     select distinct a.salary
     from
     (select salary,
     dense_rank() over(order by salary desc) as rk
     from Employee) a
     where a.rk = N
  );
END

 -- ##########################################################################
 -- Question 84
-- Table: Friendship

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | user1_id      | int     |
-- | user2_id      | int     |
-- +---------------+---------+
-- (user1_id, user2_id) is the primary key for this table.
-- Each row of this table indicates that there is a friendship relation between user1_id and user2_id.


-- Table: Likes

-- +-------------+---------+
-- | Column Name | Type    |
-- +-------------+---------+
-- | user_id     | int     |
-- | page_id     | int     |
-- +-------------+---------+
-- (user_id, page_id) is the primary key for this table.
-- Each row of this table indicates that user_id likes page_id.


-- Write an SQL query to recommend pages to the user with user_id = 1 using the pages that your friends liked. It should not recommend pages you already liked.

-- Return result table in any order without duplicates.

-- The query result format is in the following example:
```

```
-- Friendship table:
-- +----------+----------+
-- | user1_id | user2_id |
-- +----------+----------+
-- | 1        | 2        |
-- | 1        | 3        |
-- | 1        | 4        |
-- | 2        | 3        |
-- | 2        | 4        |
-- | 2        | 5        |
-- | 6        | 1        |
-- +----------+----------+

-- Likes table:
-- +---------+---------+
-- | user_id | page_id |
-- +---------+---------+
-- | 1       | 88      |
-- | 2       | 23      |
-- | 3       | 24      |
-- | 4       | 56      |
-- | 5       | 11      |
-- | 6       | 33      |
-- | 2       | 77      |
-- | 3       | 77      |
-- | 6       | 88      |
-- +---------+---------+

-- Result table:
-- +------------------+
-- | recommended_page |
-- +------------------+
-- | 23               |
-- | 24               |
-- | 56               |
-- | 33               |
-- | 77               |
-- +------------------+
-- User one is friend with users 2, 3, 4 and 6.
-- Suggested pages are 23 from user 2, 24 from user 3, 56 from user 3 and 33 from user 6.
-- Page 77 is suggested from both user 2 and user 3.
-- Page 88 is not suggested because user 1 already likes it.

-- ======= Solution
================================================================================

select distinct page_id as recommended_page
from likes
where user_id =
any(select user2_id as id
from friendship
```

```
where user1_id = 1 or user2_id = 1 and user2_id !=1
union all
select user1_id
from friendship
where user2_id = 1)
and page_id != all(select page_id from likes where user_id = 1)

 -- ##########################################################################
 -- Question 67
-- Table: Products

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | product_id    | int     |
-- | new_price     | int     |
-- | change_date   | date    |
-- +---------------+---------+
-- (product_id, change_date) is the primary key of this table.
-- Each row of this table indicates that the price of some product was changed to a new price at some date.


-- Write an SQL query to find the prices of all products on 2019-08-16. Assume the price of all products before any change is 10.

-- The query result format is in the following example:

-- Products table:
-- +------------+-----------+-------------+
-- | product_id | new_price | change_date |
-- +------------+-----------+-------------+
-- | 1          | 20        | 2019-08-14  |
-- | 2          | 50        | 2019-08-14  |
-- | 1          | 30        | 2019-08-15  |
-- | 1          | 35        | 2019-08-16  |
-- | 2          | 65        | 2019-08-17  |
-- | 3          | 20        | 2019-08-18  |
-- +------------+-----------+-------------+

-- Result table:
-- +------------+-------+
-- | product_id | price |
-- +------------+-------+
-- | 2          | 50    |
-- | 1          | 35    |
-- | 3          | 10    |
-- +------------+-------+

-- ======= Solution
==========================================================================================
```

```
with t1 as (
select a.product_id, new_price
from(
Select product_id, max(change_date) as date
from products
where change_date<='2019-08-16'
group by product_id) a
join products p
on a.product_id = p.product_id and a.date = p.change_date),

t2 as (
select distinct product_id
            from products)

select t2.product_id, coalesce(new_price,10) as price
from t2 left join t1
on t2.product_id = t1.product_id
order by price desc

 -- ##########################################################################
 -- Question 90
-- Table: Sales

-- +--------------+-------+
-- | Column Name | Type  |
-- +--------------+-------+
-- | sale_id     | int   |
-- | product_id  | int   |
-- | year        | int   |
-- | quantity    | int   |
-- | price       | int   |
-- +--------------+-------+
-- sale_id is the primary key of this table.
-- product_id is a foreign key to Product table.
-- Note that the price is per unit.
-- Table: Product

-- +--------------+---------+
-- | Column Name  | Type    |
-- +--------------+---------+
-- | product_id   | int     |
-- | product_name | varchar |
-- +--------------+---------+
-- product_id is the primary key of this table.



-- Write an SQL query that selects the product id, year, quantity, and price for the first year of every product sold.

-- The query result format is in the following example:

-- Sales table:
```

```
-- +---------+------------+------+----------+-------+
-- | sale_id | product_id | year | quantity | price |
-- +---------+------------+------+----------+-------+
-- | 1       | 100        | 2008 | 10       | 5000  |
-- | 2       | 100        | 2009 | 12       | 5000  |
-- | 7       | 200        | 2011 | 15       | 9000  |
-- +---------+------------+------+----------+-------+

-- Product table:
-- +------------+--------------+
-- | product_id | product_name |
-- +------------+--------------+
-- | 100        | Nokia        |
-- | 200        | Apple        |
-- | 300        | Samsung      |
-- +------------+--------------+

-- Result table:
-- +------------+------------+----------+-------+
-- | product_id | first_year | quantity | price |
-- +------------+------------+----------+-------+
-- | 100        | 2008       | 10       | 5000  |
-- | 200        | 2011       | 15       | 9000  |
-- +------------+------------+----------+-------+

-- ======= Solution
================================================================================

select a.product_id, a.year as first_year, a.quantity, a.price
from
( select product_id, quantity, price, year,
  rank() over(partition by product_id order by year) as rk
  from sales
) a
where a.rk = 1

 -- ##########################################################################
 -- Question 85
-- Table: Project

-- +-------------+---------+
-- | Column Name | Type    |
-- +-------------+---------+
-- | project_id  | int     |
-- | employee_id | int     |
-- +-------------+---------+
-- (project_id, employee_id) is the primary key of this table.
-- employee_id is a foreign key to Employee table.
-- Table: Employee

-- +-------------------+---------+
```

```
-- | Column Name      | Type    |
-- +------------------+---------+
-- | employee_id      | int     |
-- | name             | varchar |
-- | experience_years | int     |
-- +------------------+---------+
-- employee_id is the primary key of this table.


-- Write an SQL query that reports the most experienced employees in each project.
-- In case of a tie, report all employees with the maximum number of experience years.

-- The query result format is in the following example:

-- Project table:
-- +-------------+-------------+
-- | project_id  | employee_id |
-- +-------------+-------------+
-- | 1           | 1           |
-- | 1           | 2           |
-- | 1           | 3           |
-- | 2           | 1           |
-- | 2           | 4           |
-- +-------------+-------------+

-- Employee table:
-- +-------------+--------+------------------+
-- | employee_id | name   | experience_years |
-- +-------------+--------+------------------+
-- | 1           | Khaled | 3                |
-- | 2           | Ali    | 2                |
-- | 3           | John   | 3                |
-- | 4           | Doe    | 2                |
-- +-------------+--------+------------------+

-- Result table:
-- +-------------+---------------+
-- | project_id  | employee_id   |
-- +-------------+---------------+
-- | 1           | 1             |
-- | 1           | 3             |
-- | 2           | 1             |
-- +-------------+---------------+
-- Both employees with id 1 and 3 have the
-- most experience among the employees of the first project. For the second project, the employee with id 1 has the
most experience.

-- ======= Solution
================================================================================

with t1 as(
```

```
select p.project_id, p.employee_id, e.experience_years,
rank() over(partition by project_id order by experience_years desc) as rk
from project p
join employee e
on p.employee_id = e.employee_id)

select t1.project_id, t1.employee_id
from t1
where t1.rk = 1


 -- ##########################################################################
 -- Question 51
-- Write a SQL query to rank scores.
-- If there is a tie between two scores, both should have the same ranking.
-- Note that after a tie, the next ranking number should be the next consecutive integer value.
-- In other words, there should be no "holes" between ranks.

-- +----+-------+
-- | Id | Score |
-- +----+-------+
-- | 1  | 3.50  |
-- | 2  | 3.65  |
-- | 3  | 4.00  |
-- | 4  | 3.85  |
-- | 5  | 4.00  |
-- | 6  | 3.65  |
-- +----+-------+
-- For example, given the above Scores table, your query should generate the following report (order by highest score):

-- +-------+---------+
-- | score | Rank    |
-- +-------+---------+
-- | 4.00  | 1       |
-- | 4.00  | 1       |
-- | 3.85  | 2       |
-- | 3.65  | 3       |
-- | 3.65  | 3       |
-- | 3.50  | 4       |
-- +-------+---------+
-- Important Note: For MySQL solutions, to escape reserved words used as column names,
-- you can use an apostrophe before and after the keyword. For example `Rank`.

-- ======= Solution
================================================================================

select Score,
dense_rank() over(order by score desc) as "Rank"
from scores

 -- ##########################################################################
```

```
 -- Question 79
-- Table: Points

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | id            | int     |
-- | x_value       | int     |
-- | y_value       | int     |
-- +---------------+---------+
-- id is the primary key for this table.
-- Each point is represented as a 2D Dimensional (x_value, y_value).
-- Write an SQL query to report of all possible rectangles which can be formed by any two points of the table.

-- Each row in the result contains three columns (p1, p2, area) where:

-- p1 and p2 are the id of two opposite corners of a rectangle and p1 < p2.
-- Area of this rectangle is represented by the column area.
-- Report the query in descending order by area in case of tie in ascending order by p1 and p2.

-- Points table:
-- +----------+-------------+-------------+
-- | id       | x_value     | y_value     |
-- +----------+-------------+-------------+
-- | 1        | 2           | 8           |
-- | 2        | 4           | 7           |
-- | 3        | 2           | 10          |
-- +----------+-------------+-------------+

-- Result table:
-- +----------+-------------+-------------+
-- | p1       | p2          | area        |
-- +----------+-------------+-------------+
-- | 2        | 3           | 6           |
-- | 1        | 2           | 2           |
-- +----------+-------------+-------------+

-- p1 should be less than p2 and area greater than 0.
-- p1 = 1 and p2 = 2, has an area equal to |2-4| * |8-7| = 2.
-- p1 = 2 and p2 = 3, has an area equal to |4-2| * |7-10| = 6.
-- p1 = 1 and p2 = 3 It's not possible because the rectangle has an area equal to 0.

-- ======= Solution
================================================================================

select p1.id as p1, p2.id as p2, abs(p1.x_value-p2.x_value)*abs(p1.y_value-p2.y_value) as area
from points p1 cross join points p2
where p1.x_value!=p2.x_value and p1.y_value!=p2.y_value and p1.id<p2.id
order by area desc, p1, p2

 -- ######################################################################
```

-- Question 73
-- Table: Actions

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | user_id       | int     |
-- | post_id       | int     |
-- | action_date   | date    |
-- | action        | enum    |
-- | extra         | varchar |
-- +---------------+---------+
-- There is no primary key for this table, it may have duplicate rows.
-- The action column is an ENUM type of ('view', 'like', 'reaction', 'comment', 'report', 'share').
-- The extra column has optional information about the action such as a reason for report or a type of reaction.
-- Table: Removals

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | post_id       | int     |
-- | remove_date   | date    |
-- +---------------+---------+
-- post_id is the primary key of this table.
-- Each row in this table indicates that some post was removed as a result of being reported or as a result of an admin review.

-- Write an SQL query to find the average for daily percentage of posts that got removed after being reported as spam, rounded to 2 decimal places.

-- The query result format is in the following example:

-- Actions table:
-- +---------+---------+-------------+--------+--------+
-- | user_id | post_id | action_date | action | extra  |
-- +---------+---------+-------------+--------+--------+
-- | 1       | 1       | 2019-07-01  | view   | null   |
-- | 1       | 1       | 2019-07-01  | like   | null   |
-- | 1       | 1       | 2019-07-01  | share  | null   |
-- | 2       | 2       | 2019-07-04  | view   | null   |
-- | 2       | 2       | 2019-07-04  | report | spam   |
-- | 3       | 4       | 2019-07-04  | view   | null   |
-- | 3       | 4       | 2019-07-04  | report | spam   |
-- | 4       | 3       | 2019-07-02  | view   | null   |
-- | 4       | 3       | 2019-07-02  | report | spam   |
-- | 5       | 2       | 2019-07-03  | view   | null   |
-- | 5       | 2       | 2019-07-03  | report | racism |
-- | 5       | 5       | 2019-07-03  | view   | null   |
-- | 5       | 5       | 2019-07-03  | report | racism |
-- +---------+---------+-------------+--------+--------+

```
-- Removals table:
-- +---------+-------------+
-- | post_id | remove_date |
-- +---------+-------------+
-- | 2       | 2019-07-20  |
-- | 3       | 2019-07-18  |
-- +---------+-------------+

-- Result table:
-- +-----------------------+
-- | average_daily_percent |
-- +-----------------------+
-- | 75.00                 |
-- +-----------------------+
-- The percentage for 2019-07-04 is 50% because only one post of two spam reported posts was removed.
-- The percentage for 2019-07-02 is 100% because one post was reported as spam and it was removed.
-- The other days had no spam reports so the average is (50 + 100) / 2 = 75%
-- Note that the output is only one number and that we do not care about the remove dates.

-- ======= Solution
================================================================================

with t1 as(
select a.action_date, (count(distinct r.post_id)+0.0)/(count(distinct a.post_id)+0.0) as result
from (select action_date, post_id
from actions
where extra = 'spam' and action = 'report') a
left join
removals r
on a.post_id = r.post_id
group by a.action_date)

select round(avg(t1.result)*100,2) as  average_daily_percent
from t1



 -- ##########################################################################
 -- Question 71
-- Table: Customer

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | customer_id   | int     |
-- | name          | varchar |
-- | visited_on    | date    |
-- | amount        | int     |
-- +---------------+---------+
-- (customer_id, visited_on) is the primary key for this table.
-- This table contains data about customer transactions in a restaurant.
```

-- visited_on is the date on which the customer with ID (customer_id) have visited the restaurant.
-- amount is the total paid by a customer.

-- You are the restaurant owner and you want to analyze a possible expansion (there will be at least one customer every day).

-- Write an SQL query to compute moving average of how much customer paid in a 7 days window (current day + 6 days before) .

-- The query result format is in the following example:

-- Return result table ordered by visited_on.

-- average_amount should be rounded to 2 decimal places, all dates are in the format ('YYYY-MM-DD').

-- Customer table:
-- +-------------+--------------+--------------+-------------+
-- | customer_id | name         | visited_on   | amount      |
-- +-------------+--------------+--------------+-------------+
-- | 1           | Jhon         | 2019-01-01   | 100         |
-- | 2           | Daniel       | 2019-01-02   | 110         |
-- | 3           | Jade         | 2019-01-03   | 120         |
-- | 4           | Khaled       | 2019-01-04   | 130         |
-- | 5           | Winston      | 2019-01-05   | 110         |
-- | 6           | Elvis        | 2019-01-06   | 140         |
-- | 7           | Anna         | 2019-01-07   | 150         |
-- | 8           | Maria        | 2019-01-08   | 80          |
-- | 9           | Jaze         | 2019-01-09   | 110         |
-- | 1           | Jhon         | 2019-01-10   | 130         |
-- | 3           | Jade         | 2019-01-10   | 150         |
-- +-------------+--------------+--------------+-------------+

-- Result table:
-- +--------------+--------------+----------------+
-- | visited_on   | amount       | average_amount |
-- +--------------+--------------+----------------+
-- | 2019-01-07   | 860          | 122.86         |
-- | 2019-01-08   | 840          | 120            |
-- | 2019-01-09   | 840          | 120            |
-- | 2019-01-10   | 1000         | 142.86         |
-- +--------------+--------------+----------------+

-- 1st moving average from 2019-01-01 to 2019-01-07 has an average_amount of (100 + 110 + 120 + 130 + 110 + 140 + 150)/7 = 122.86
-- 2nd moving average from 2019-01-02 to 2019-01-08 has an average_amount of (110 + 120 + 130 + 110 + 140 + 150 + 80)/7 = 120
-- 3rd moving average from 2019-01-03 to 2019-01-09 has an average_amount of (120 + 130 + 110 + 140 + 150 + 80 + 110)/7 = 120

-- 4th moving average from 2019-01-04 to 2019-01-10 has an average_amount of (130 + 110 + 140 + 150 + 80 + 110 + 130 + 150)/7 = 142.86

-- ======= Solution
==========

```
select visited_on, sum(amount) over(order by visited_on rows 6 preceding),
round(avg(amount) over(order by visited_on rows 6 preceding),2)
from
(
        select visited_on, sum(amount) as amount
        from customer
        group by visited_on
        order by visited_on
) a
order by visited_on offset 6 rows
```

-- ##########################################################################
-- Question 76
-- Table: Scores

```
-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | player_name   | varchar |
-- | gender        | varchar |
-- | day           | date    |
-- | score_points  | int     |
-- +---------------+---------+
```

-- (gender, day) is the primary key for this table.
-- A competition is held between females team and males team.
-- Each row of this table indicates that a player_name and with gender has scored score_point in someday.
-- Gender is 'F' if the player is in females team and 'M' if the player is in males team.

-- Write an SQL query to find the total score for each gender at each day.

-- Order the result table by gender and day

-- The query result format is in the following example:

-- Scores table:

```
-- +-------------+--------+------------+--------------+
-- | player_name | gender | day        | score_points |
-- +-------------+--------+------------+--------------+
-- | Aron        | F      | 2020-01-01 | 17           |
-- | Alice       | F      | 2020-01-07 | 23           |
-- | Bajrang     | M      | 2020-01-07 | 7            |
-- | Khali       | M      | 2019-12-25 | 11           |
-- | Slaman      | M      | 2019-12-30 | 13           |
-- | Joe         | M      | 2019-12-31 | 3            |
```

```
-- | Jose       | M      | 2019-12-18 | 2           |
-- | Priya      | F      | 2019-12-31 | 23          |
-- | Priyanka   | F      | 2019-12-30 | 17          |
-- +-------------+--------+------------+-------------+
-- Result table:
-- +--------+------------+-------+
-- | gender | day        | total |
-- +--------+------------+-------+
-- | F      | 2019-12-30 | 17    |
-- | F      | 2019-12-31 | 40    |
-- | F      | 2020-01-01 | 57    |
-- | F      | 2020-01-07 | 80    |
-- | M      | 2019-12-18 | 2     |
-- | M      | 2019-12-25 | 13    |
-- | M      | 2019-12-30 | 26    |
-- | M      | 2019-12-31 | 29    |
-- | M      | 2020-01-07 | 36    |
-- +--------+------------+-------+
-- For females team:
-- First day is 2019-12-30, Priyanka scored 17 points and the total score for the team is 17.
-- Second day is 2019-12-31, Priya scored 23 points and the total score for the team is 40.
-- Third day is 2020-01-01, Aron scored 17 points and the total score for the team is 57.
-- Fourth day is 2020-01-07, Alice scored 23 points and the total score for the team is 80.
-- For males team:
-- First day is 2019-12-18, Jose scored 2 points and the total score for the team is 2.
-- Second day is 2019-12-25, Khali scored 11 points and the total score for the team is 13.
-- Third day is 2019-12-30, Slaman scored 13 points and the total score for the team is 26.
-- Fourth day is 2019-12-31, Joe scored 3 points and the total score for the team is 29.
-- Fifth day is 2020-01-07, Bajrang scored 7 points and the total score for the team is 36.

-- ======= Solution
================================================================================

select gender, day,
sum(score_points) over(partition by gender order by day) as total
from scores
group by 1,2
order by 1,2

 -- ###########################################################################
 -- Question 70
-- In facebook, there is a follow table with two columns: followee, follower.

-- Please write a sql query to get the amount of each follower's follower if he/she has one.

-- For example:

-- +-------------+------------+
-- | followee    | follower   |
-- +-------------+------------+
-- |     A       |     B      |
```

```
-- |    B      |    C     |
-- |    B      |    D     |
-- |    D      |    E     |
-- +-------------+------------+
-- should output:
-- +-------------+------------+
-- | follower    | num        |
-- +-------------+------------+
-- |    B      |  2         |
-- |    D      |  1         |
-- +-------------+------------+
-- Explaination:
-- Both B and D exist in the follower list, when as a followee, B's follower is C and D, and D's follower is E. A does not exist in follower list.


-- Note:
-- Followee would not follow himself/herself in all cases.
-- Please display the result in follower's alphabet order.

-- ======= Solution
================================================================================

select followee as follower, count(distinct(follower)) as num
from follow
where followee = any(select follower from follow)
group by followee
order by followee

 -- ######################################################################
 -- Question 89
-- Table point_2d holds the coordinates (x,y) of some unique points (more than two) in a plane.


-- Write a query to find the shortest distance between these points rounded to 2 decimals.


-- | x  | y  |
-- |----|----|
-- | -1 | -1 |
-- | 0  | 0  |
-- | -1 | -2 |


-- The shortest distance is 1.00 from point (-1,-1) to (-1,2). So the output should be:


-- | shortest |
-- |----------|
-- | 1.00     |
```

-- Note: The longest distance among all the points are less than 10000.

-- ======= Solution
==========

```
select round(a.shortest,2) as shortest
from(
select sqrt(pow((p1.x-p2.x),2)+pow((p1.y-p2.y),2)) as shortest
from point_2d p1
cross join point_2d p2
where p1.x!=p2.x or p1.y!=p2.y
order by sqrt(pow((p1.x-p2.x),2)+pow((p1.y-p2.y),2))
limit 1) a
```

-- ##########################################################################
-- Question 65
-- Table: Events

```
-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | business_id   | int     |
-- | event_type    | varchar |
-- | occurences    | int     |
-- +---------------+---------+
```

-- (business_id, event_type) is the primary key of this table.
-- Each row in the table logs the info that an event of some type occured at some business for a number of times.

-- Write an SQL query to find all active businesses.

-- An active business is a business that has more than one event type with occurences greater than the average occurences of that event type among all businesses.

-- The query result format is in the following example:

-- Events table:

```
-- +-------------+------------+------------+
-- | business_id | event_type | occurences |
-- +-------------+------------+------------+
-- | 1           | reviews    | 7          |
-- | 3           | reviews    | 3          |
-- | 1           | ads        | 11         |
-- | 2           | ads        | 7          |
-- | 3           | ads        | 6          |
-- | 1           | page views | 3          |
-- | 2           | page views | 12         |
-- +-------------+------------+------------+
```

-- Result table:

```
-- +-------------+
-- | business_id |
-- +-------------+
-- | 1           |
-- +-------------+
-- Average for 'reviews', 'ads' and 'page views' are (7+3)/2=5, (11+7+6)/3=8, (3+12)/2=7.5 respectively.
-- Business with id 1 has 7 'reviews' events (more than 5) and 11 'ads' events (more than 8) so it is an active business.

-- ======= Solution
================================================================================

select c.business_id
from(
select *
from events e
join
(select event_type as event, round(avg(occurences),2) as average from events group by event_type) b
on e.event_type = b.event) c
where c.occurences>c.average
group by c.business_id
having count(*) > 1
--Question 94
-- Table Accounts:

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | id            | int     |
-- | name          | varchar |
-- +---------------+---------+
-- the id is the primary key for this table.
-- This table contains the account id and the user name of each account.


-- Table Logins:

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | id            | int     |
-- | login_date    | date    |
-- +---------------+---------+
-- There is no primary key for this table, it may contain duplicates.
-- This table contains the account id of the user who logged in and the login date. A user may log in multiple times in the day.


-- Write an SQL query to find the id and the name of active users.

-- Active users are those who logged in to their accounts for 5 or more consecutive days.
```

-- Return the result table ordered by the id.

-- The query result format is in the following example:

-- Accounts table:
-- +----+----------+
-- | id | name     |
-- +----+----------+
-- | 1  | Winston  |
-- | 7  | Jonathan |
-- +----+----------+

-- Logins table:
-- +----+------------+
-- | id | login_date |
-- +----+------------+
-- | 7  | 2020-05-30 |
-- | 1  | 2020-05-30 |
-- | 7  | 2020-05-31 |
-- | 7  | 2020-06-01 |
-- | 7  | 2020-06-02 |
-- | 7  | 2020-06-02 |
-- | 7  | 2020-06-03 |
-- | 1  | 2020-06-07 |
-- | 7  | 2020-06-10 |
-- +----+------------+

-- Result table:
-- +----+----------+
-- | id | name     |
-- +----+----------+
-- | 7  | Jonathan |
-- +----+----------+
-- User Winston with id = 1 logged in 2 times only in 2 different days, so, Winston is not an active user.
-- User Jonathan with id = 7 logged in 7 times in 6 different days, five of them were consecutive days, so, Jonathan is an active user.

-- ======= Solution
==========

```
with t1 as (
select id,login_date,
lead(login_date,4) over(partition by id order by login_date) date_5
from (select distinct * from Logins) b
)

select distinct a.id, a.name from t1
inner join accounts a
on t1.id = a.id
where datediff(t1.date_5,login_date) = 4
order by id
```

```
-- ##########################################################################
-- Question 77
-- Table: Friends

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | id            | int     |
-- | name          | varchar |
-- | activity      | varchar |
-- +---------------+---------+
-- id is the id of the friend and primary key for this table.
-- name is the name of the friend.
-- activity is the name of the activity which the friend takes part in.
-- Table: Activities

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | id            | int     |
-- | name          | varchar |
-- +---------------+---------+
-- id is the primary key for this table.
-- name is the name of the activity.


-- Write an SQL query to find the names of all the activities with neither maximum, nor minimum number of participants.

-- Return the result table in any order. Each activity in table Activities is performed by any person in the table Friends.

-- The query result format is in the following example:

-- Friends table:
-- +------+--------------+---------------+
-- | id   | name         | activity      |
-- +------+--------------+---------------+
-- | 1    | Jonathan D.  | Eating        |
-- | 2    | Jade W.      | Singing       |
-- | 3    | Victor J.    | Singing       |
-- | 4    | Elvis Q.     | Eating        |
-- | 5    | Daniel A.    | Eating        |
-- | 6    | Bob B.       | Horse Riding  |
-- +------+--------------+---------------+

-- Activities table:
-- +------+--------------+
-- | id   | name         |
-- +------+--------------+
-- | 1    | Eating       |
```

```
-- | 2    | Singing      |
-- | 3    | Horse Riding |
-- +------+--------------+

-- Result table:
-- +--------------+
-- | activity     |
-- +--------------+
-- | Singing      |
-- +--------------+

-- Eating activity is performed by 3 friends, maximum number of participants, (Jonathan D. , Elvis Q. and Daniel A.)
-- Horse Riding activity is performed by 1 friend, minimum number of participants, (Bob B.)
-- Singing is performed by 2 friends (Victor J. and Jade W.)

-- ======= Solution
================================================================================

with t1 as(
select max(a.total) as total
from(
   select activity, count(*) as total
   from friends
   group by activity) a
          union all
          select min(b.total) as low
   from(
   select activity, count(*) as total
   from friends
   group by activity) b),
t2 as
(
   select activity, count(*) as total
   from friends
   group by activity
)

select activity
from t1 right join t2
on t1.total = t2.total
where t1.total is null


 -- ######################################################################
 -- Question 55
-- Table: Employees

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | employee_id   | int     |
```

-- | employee_name | varchar |
-- | manager_id    | int     |
-- +---------------+---------+
-- employee_id is the primary key for this table.
-- Each row of this table indicates that the employee with ID employee_id and name employee_name reports his
-- work to his/her direct manager with manager_id
-- The head of the company is the employee with employee_id = 1.


-- Write an SQL query to find employee_id of all employees that directly or indirectly report their work to the head of the company.

-- The indirect relation between managers will not exceed 3 managers as the company is small.

-- Return result table in any order without duplicates.

-- The query result format is in the following example:

-- Employees table:
-- +-------------+---------------+------------+
-- | employee_id | employee_name | manager_id |
-- +-------------+---------------+------------+
-- | 1           | Boss          | 1          |
-- | 3           | Alice         | 3          |
-- | 2           | Bob           | 1          |
-- | 4           | Daniel        | 2          |
-- | 7           | Luis          | 4          |
-- | 8           | Jhon          | 3          |
-- | 9           | Angela        | 8          |
-- | 77          | Robert        | 1          |
-- +-------------+---------------+------------+

-- Result table:
-- +-------------+
-- | employee_id |
-- +-------------+
-- | 2           |
-- | 77          |
-- | 4           |
-- | 7           |
-- +-------------+

-- The head of the company is the employee with employee_id 1.
-- The employees with employee_id 2 and 77 report their work directly to the head of the company.
-- The employee with employee_id 4 report his work indirectly to the head of the company 4 --> 2 --> 1.
-- The employee with employee_id 7 report his work indirectly to the head of the company 7 --> 4 --> 2 --> 1.
-- The employees with employee_id 3, 8 and 9 don't report their work to head of company directly or indirectly.

-- ======= Solution
==========

```
select employee_id
from employees
where manager_id = 1 and employee_id != 1
union
select employee_id
from employees
where manager_id = any (select employee_id
from employees
where manager_id = 1 and employee_id != 1)
union
select employee_id
from employees
where manager_id = any (select employee_id
from employees
where manager_id = any (select employee_id
from employees
where manager_id = 1 and employee_id != 1))

 -- ##########################################################################
 -- Question 66
-- Table: Sales

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | sale_date     | date    |
-- | fruit         | enum    |
-- | sold_num      | int     |
-- +---------------+---------+
-- (sale_date,fruit) is the primary key for this table.
-- This table contains the sales of "apples" and "oranges" sold each day.


-- Write an SQL query to report the difference between number of apples and oranges sold each day.

-- Return the result table ordered by sale_date in format ('YYYY-MM-DD').

-- The query result format is in the following example:



-- Sales table:
-- +------------+------------+-------------+
-- | sale_date  | fruit      | sold_num    |
-- +------------+------------+-------------+
-- | 2020-05-01 | apples     | 10          |
-- | 2020-05-01 | oranges    | 8           |
-- | 2020-05-02 | apples     | 15          |
-- | 2020-05-02 | oranges    | 15          |
-- | 2020-05-03 | apples     | 20          |
-- | 2020-05-03 | oranges    | 0           |
```

```
-- | 2020-05-04 | apples     | 15         |
-- | 2020-05-04 | oranges    | 16         |
-- +------------+------------+------------+

-- Result table:
-- +------------+--------------+
-- | sale_date  | diff         |
-- +------------+--------------+
-- | 2020-05-01 | 2            |
-- | 2020-05-02 | 0            |
-- | 2020-05-03 | 20           |
-- | 2020-05-04 | -1           |
-- +------------+--------------+

-- Day 2020-05-01, 10 apples and 8 oranges were sold (Difference  10 - 8 = 2).
-- Day 2020-05-02, 15 apples and 15 oranges were sold (Difference 15 - 15 = 0).
-- Day 2020-05-03, 20 apples and 0 oranges were sold (Difference 20 - 0 = 20).
-- Day 2020-05-04, 15 apples and 16 oranges were sold (Difference 15 - 16 = -1).

-- ======= Solution
================================================================================

Select sale_date, sold_num-sold as diff
from
((select *
from sales
where fruit = 'apples') a
join
(select sale_date as sale, fruit, sold_num as sold
from sales
where fruit = 'oranges') b
on a.sale_date = b.sale)

 -- ######################################################################
 -- Question 81
-- Table: Views

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | article_id    | int     |
-- | author_id     | int     |
-- | viewer_id     | int     |
-- | view_date     | date    |
-- +---------------+---------+
-- There is no primary key for this table, it may have duplicate rows.
-- Each row of this table indicates that some viewer viewed an article (written by some author) on some date.
-- Note that equal author_id and viewer_id indicate the same person.
```

-- Write an SQL query to find all the people who viewed more than one article on the same date, sorted in ascending order by their id.

-- The query result format is in the following example:

-- Views table:
-- +------------+-----------+-----------+------------+
-- | article_id | author_id | viewer_id | view_date  |
-- +------------+-----------+-----------+------------+
-- | 1          | 3         | 5         | 2019-08-01 |
-- | 3          | 4         | 5         | 2019-08-01 |
-- | 1          | 3         | 6         | 2019-08-02 |
-- | 2          | 7         | 7         | 2019-08-01 |
-- | 2          | 7         | 6         | 2019-08-02 |
-- | 4          | 7         | 1         | 2019-07-22 |
-- | 3          | 4         | 4         | 2019-07-21 |
-- | 3          | 4         | 4         | 2019-07-21 |
-- +------------+-----------+-----------+------------+

-- Result table:
-- +------+
-- | id   |
-- +------+
-- | 5    |
-- | 6    |
-- +------+

-- ======= Solution
==========

select distinct viewer_id as id#, count(distinct article_id) as total
from views
group by viewer_id, view_date
having count(distinct article_id)>1
order by 1

-- ##########################################################################
-- Question 74
-- Table Salaries:

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | company_id    | int     |
-- | employee_id   | int     |
-- | employee_name | varchar |
-- | salary        | int     |
-- +---------------+---------+
-- (company_id, employee_id) is the primary key for this table.
-- This table contains the company id, the id, the name and the salary for an employee.

-- Write an SQL query to find the salaries of the employees after applying taxes.

-- The tax rate is calculated for each company based on the following criteria:

-- 0% If the max salary of any employee in the company is less than 1000$.
-- 24% If the max salary of any employee in the company is in the range [1000, 10000] inclusive.
-- 49% If the max salary of any employee in the company is greater than 10000$.
-- Return the result table in any order. Round the salary to the nearest integer.

-- The query result format is in the following example:

-- Salaries table:
-- +------------+-------------+---------------+--------+
-- | company_id | employee_id | employee_name | salary |
-- +------------+-------------+---------------+--------+
-- | 1 | 1 | Tony | 2000 |
-- | 1 | 2 | Pronub | 21300 |
-- | 1 | 3 | Tyrrox | 10800 |
-- | 2 | 1 | Pam | 300 |
-- | 2 | 7 | Bassem | 450 |
-- | 2 | 9 | Hermione | 700 |
-- | 3 | 7 | Bocaben | 100 |
-- | 3 | 2 | Ognjen | 2200 |
-- | 3 | 13 | Nyancat | 3300 |
-- | 3 | 15 | Morninngcat | 1866 |
-- +------------+-------------+---------------+--------+

-- Result table:
-- +------------+-------------+---------------+--------+
-- | company_id | employee_id | employee_name | salary |
-- +------------+-------------+---------------+--------+
-- | 1 | 1 | Tony | 1020 |
-- | 1 | 2 | Pronub | 10863 |
-- | 1 | 3 | Tyrrox | 5508 |
-- | 2 | 1 | Pam | 300 |
-- | 2 | 7 | Bassem | 450 |
-- | 2 | 9 | Hermione | 700 |
-- | 3 | 7 | Bocaben | 76 |
-- | 3 | 2 | Ognjen | 1672 |
-- | 3 | 13 | Nyancat | 2508 |
-- | 3 | 15 | Morninngcat | 5911 |
-- +------------+-------------+---------------+--------+
-- For company 1, Max salary is 21300. Employees in company 1 have taxes = 49%
-- For company 2, Max salary is 700. Employees in company 2 have taxes = 0%
-- For company 3, Max salary is 7777. Employees in company 3 have taxes = 24%
-- The salary after taxes = salary - (taxes percentage / 100) * salary
-- For example, Salary for Morninngcat (3, 15) after taxes = 7777 - 7777 * (24 / 100) = 7777 - 1866.48 = 5910.52, which is rounded to 5911.

```
-- ======= Solution
================================================================================

with t1 as (
select company_id, employee_id, employee_name, salary as sa, max(salary) over(partition by company_id) as maximum
from salaries)

select company_id, employee_id, employee_name,
case when t1.maximum<1000 then t1.sa
when t1.maximum between 1000 and 10000 then round(t1.sa*.76,0)
else round(t1.sa*.51,0)
end as salary
from t1

 -- ###########################################################################
 -- Question 61
-- Table: Stocks

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | stock_name    | varchar |
-- | operation     | enum    |
-- | operation_day | int     |
-- | price         | int     |
-- +---------------+---------+
-- (stock_name, day) is the primary key for this table.
-- The operation column is an ENUM of type ('Sell', 'Buy')
-- Each row of this table indicates that the stock which has stock_name had an operation on the day operation_day with the price.
-- It is guaranteed that each 'Sell' operation for a stock has a corresponding 'Buy' operation in a previous day.


-- Write an SQL query to report the Capital gain/loss for each stock.

-- The capital gain/loss of a stock is total gain or loss after buying and selling the stock one or many times.

-- Return the result table in any order.

-- The query result format is in the following example:

-- Stocks table:
-- +---------------+-----------+---------------+--------+
-- | stock_name    | operation | operation_day | price  |
-- +---------------+-----------+---------------+--------+
-- | Leetcode      | Buy       | 1             | 1000   |
-- | Corona Masks  | Buy       | 2             | 10     |
-- | Leetcode      | Sell      | 5             | 9000   |
-- | Handbags      | Buy       | 17            | 30000  |
-- | Corona Masks  | Sell      | 3             | 1010   |
-- | Corona Masks  | Buy       | 4             | 1000   |
```

```
-- | Corona Masks  | Sell      | 5            | 500    |
-- | Corona Masks  | Buy       | 6            | 1000   |
-- | Handbags      | Sell      | 29           | 7000   |
-- | Corona Masks  | Sell      | 10           | 10000  |
-- +---------------+-----------+--------------+--------+

-- Result table:
-- +---------------+-------------------+
-- | stock_name    | capital_gain_loss |
-- +---------------+-------------------+
-- | Corona Masks  | 9500              |
-- | Leetcode      | 8000              |
-- | Handbags      | -23000            |
-- +---------------+-------------------+
-- Leetcode stock was bought at day 1 for 1000$ and was sold at day 5 for 9000$. Capital gain = 9000 - 1000 = 8000$.
-- Handbags stock was bought at day 17 for 30000$ and was sold at day 29 for 7000$. Capital loss = 7000 - 30000 = -23000$.
-- Corona Masks stock was bought at day 1 for 10$ and was sold at day 3 for 1010$. It was bought again at day 4 for 1000$ and was sold at day 5 for 500$. At last, it was bought at day 6 for 1000$ and was sold at day 10 for 10000$. Capital gain/loss is the sum of capital gains/losses for each ('Buy' --> 'Sell')
-- operation = (1010 - 10) + (500 - 1000) + (10000 - 1000) = 1000 - 500 + 9000 = 9500$.

-- ======= Solution
================================================================================

select stock_name, (one-two) as capital_gain_loss
from(
(select stock_name, sum(price) as one
from stocks
where operation = 'Sell'
group by stock_name) b
left join
(select stock_name as name, sum(price) as two
from stocks
where operation = 'Buy'
group by stock_name) c
on b.stock_name = c.name)
order by capital_gain_loss desc

 -- ######################################################################
 -- Question 52
-- Write a SQL query to find all numbers that appear at least three times consecutively.

-- +----+-----+
-- | Id | Num |
-- +----+-----+
-- | 1  |  1  |
-- | 2  |  1  |
-- | 3  |  1  |
-- | 4  |  2  |
-- | 5  |  1  |
```

```
-- | 6  |  2  |
-- | 7  |  2  |
-- +----+-----+
-- For example, given the above Logs table, 1 is the only number that appears consecutively for at least three times.

-- +-----------------+
-- | ConsecutiveNums |
-- +-----------------+
-- | 1               |
-- +-----------------+

-- ======= Solution
================================================================================

select distinct a.num as ConsecutiveNums
from(
select *,
lag(num) over() as prev,
lead(num) over() as next
from logs) a
where a.num = a.prev and a.num=a.next

 -- ######################################################################
 -- Question 87
-- A university uses 2 data tables, student and department, to store data about its students
-- and the departments associated with each major.

-- Write a query to print the respective department name and number of students majoring in each
-- department for all departments in the department table (even ones with no current students).

-- Sort your results by descending number of students; if two or more departments have the same number of students,
-- then sort those departments alphabetically by department name.

-- The student is described as follow:

-- | Column Name  | Type      |
-- |--------------|-----------|
-- | student_id   | Integer   |
-- | student_name | String    |
-- | gender       | Character |
-- | dept_id      | Integer   |
-- where student_id is the student's ID number, student_name is the student's name, gender is their gender, and
dept_id is the department ID associated with their declared major.

-- And the department table is described as below:

-- | Column Name | Type    |
-- |-------------|---------|
-- | dept_id     | Integer |
-- | dept_name   | String  |
-- where dept_id is the department's ID number and dept_name is the department name.
```

-- Here is an example input:
-- student table:

-- | student_id | student_name | gender | dept_id |
-- |------------|--------------|--------|---------|
-- | 1 | Jack | M | 1 |
-- | 2 | Jane | F | 1 |
-- | 3 | Mark | M | 2 |
-- department table:

-- | dept_id | dept_name |
-- |---------|-------------|
-- | 1 | Engineering |
-- | 2 | Science |
-- | 3 | Law |
-- The Output should be:

-- | dept_name | student_number |
-- |-------------|----------------|
-- | Engineering | 2 |
-- | Science | 1 |
-- | Law | 0 |

-- ======= Solution
==========

select dept_name, count(s.dept_id) as student_number
from department d
left join student s
on d.dept_id = s.dept_id
group by d.dept_id
order by count(s.dept_id) desc, dept_name

-- ##########################################################################
-- Question 110
-- Table Person:

-- +----------------+---------+
-- | Column Name | Type |
-- +----------------+---------+
-- | id | int |
-- | name | varchar |
-- | phone_number | varchar |
-- +----------------+---------+
-- id is the primary key for this table.
-- Each row of this table contains the name of a person and their phone number.
-- Phone number will be in the form 'xxx-yyyyyyy' where xxx is the country code (3 characters) and yyyyyyy is the
-- phone number (7 characters) where x and y are digits. Both can contain leading zeros.
-- Table Country:

-- +----------------+---------+
-- | Column Name    | Type    |
-- +----------------+---------+
-- | name           | varchar |
-- | country_code   | varchar |
-- +----------------+---------+
-- country_code is the primary key for this table.
-- Each row of this table contains the country name and its code. country_code will be in the form 'xxx' where x is digits.

-- Table Calls:

-- +-------------+------+
-- | Column Name | Type |
-- +-------------+------+
-- | caller_id   | int  |
-- | callee_id   | int  |
-- | duration    | int  |
-- +-------------+------+
-- There is no primary key for this table, it may contain duplicates.
-- Each row of this table contains the caller id, callee id and the duration of the call in minutes. caller_id != callee_id
-- A telecommunications company wants to invest in new countries. The country intends to invest in the countries where the average call duration of the calls in this country is strictly greater than the global average call duration.

-- Write an SQL query to find the countries where this company can invest.

-- Return the result table in any order.

-- The query result format is in the following example.

-- Person table:
-- +----+----------+--------------+
-- | id | name     | phone_number |
-- +----+----------+--------------+
-- | 3  | Jonathan | 051-1234567  |
-- | 12 | Elvis    | 051-7654321  |
-- | 1  | Moncef   | 212-1234567  |
-- | 2  | Maroua   | 212-6523651  |
-- | 7  | Meir     | 972-1234567  |
-- | 9  | Rachel   | 972-0011100  |
-- +----+----------+--------------+

-- Country table:
-- +----------+--------------+
-- | name     | country_code |
-- +----------+--------------+
-- | Peru     | 051          |
-- | Israel   | 972          |
-- | Morocco  | 212          |
-- | Germany  | 049          |
-- | Ethiopia | 251          |

```
-- +----------+--------------+

-- Calls table:
-- +-----------+-----------+----------+
-- | caller_id | callee_id | duration |
-- +-----------+-----------+----------+
-- | 1         | 9         | 33       |
-- | 2         | 9         | 4        |
-- | 1         | 2         | 59       |
-- | 3         | 12        | 102      |
-- | 3         | 12        | 330      |
-- | 12        | 3         | 5        |
-- | 7         | 9         | 13       |
-- | 7         | 1         | 3        |
-- | 9         | 7         | 1        |
-- | 1         | 7         | 7        |
-- +-----------+-----------+----------+

-- Result table:
-- +----------+
-- | country  |
-- +----------+
-- | Peru     |
-- +----------+
-- The average call duration for Peru is (102 + 102 + 330 + 330 + 5 + 5) / 6 = 145.666667
-- The average call duration for Israel is (33 + 4 + 13 + 13 + 3 + 1 + 1 + 7) / 8 = 9.37500
-- The average call duration for Morocco is (33 + 4 + 59 + 59 + 3 + 7) / 6 = 27.5000
-- Global call duration average = (2 * (33 + 3 + 59 + 102 + 330 + 5 + 13 + 3 + 1 + 7)) / 20 = 55.70000
-- Since Peru is the only country where average call duration is greater than the global average, it's the only
recommended country.

-- ======= Solution
================================================================================

with t1 as(
select caller_id as id, duration as total
from
(select caller_id, duration
from calls
union all
select callee_id, duration
from calls) a
)
select name as country
from
(select distinct avg(total) over(partition by code) as avg_call, avg(total) over() as global_avg, c.name
from
((select *, coalesce(total,0) as duration, substring(phone_number from 1 for 3) as code
from person right join t1
using (id)) b
join country c
```

```
on c.country_code = b.code)) d
where avg_call > global_avg

 -- ##########################################################################
 -- Question 72
-- Table: Customers

-- +---------------------+---------+
-- | Column Name         | Type    |
-- +---------------------+---------+
-- | customer_id         | int     |
-- | customer_name       | varchar |
-- +---------------------+---------+
-- customer_id is the primary key for this table.
-- customer_name is the name of the customer.


-- Table: Orders

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | order_id      | int     |
-- | customer_id   | int     |
-- | product_name  | varchar |
-- +---------------+---------+
-- order_id is the primary key for this table.
-- customer_id is the id of the customer who bought the product "product_name".


-- Write an SQL query to report the customer_id and customer_name of customers who bought products "A", "B" but did not buy the product "C" since we want to recommend them buy this product.

-- Return the result table ordered by customer_id.

-- The query result format is in the following example.



-- Customers table:
-- +-------------+---------------+
-- | customer_id | customer_name |
-- +-------------+---------------+
-- | 1           | Daniel        |
-- | 2           | Diana         |
-- | 3           | Elizabeth     |
-- | 4           | Jhon          |
-- +-------------+---------------+

-- Orders table:
-- +------------+--------------+---------------+
```

```
-- | order_id   | customer_id  | product_name  |
-- +------------+--------------+---------------+
-- | 10         |    1         |    A          |
-- | 20         |    1         |    B          |
-- | 30         |    1         |    D          |
-- | 40         |    1         |    C          |
-- | 50         |    2         |    A          |
-- | 60         |    3         |    A          |
-- | 70         |    3         |    B          |
-- | 80         |    3         |    D          |
-- | 90         |    4         |    C          |
-- +------------+--------------+---------------+

-- Result table:
-- +-------------+---------------+
-- | customer_id | customer_name |
-- +-------------+---------------+
-- | 3           | Elizabeth     |
-- +-------------+---------------+
-- Only the customer_id with id 3 bought the product A and B but not the product C.

-- ======= Solution
================================================================================

with t1 as
(
select customer_id
from orders
where product_name = 'B' and
customer_id in (select customer_id
from orders
where product_name = 'A'))

Select t1.customer_id, c.customer_name
from t1 join customers c
on t1.customer_id = c.customer_id
where t1.customer_id != all(select customer_id
from orders
where product_name = 'C')

 -- ##########################################################################
 -- Question 93
-- Table: Customer

-- +-------------+---------+
-- | Column Name | Type    |
-- +-------------+---------+
-- | customer_id | int     |
-- | product_key | int     |
-- +-------------+---------+
-- product_key is a foreign key to Product table.
```

-- Table: Product

-- +-------------+---------+
-- | Column Name | Type    |
-- +-------------+---------+
-- | product_key | int     |
-- +-------------+---------+
-- product_key is the primary key column for this table.


-- Write an SQL query for a report that provides the customer ids from the Customer table that bought all the products in the Product table.

-- For example:

-- Customer table:
-- +-------------+-------------+
-- | customer_id | product_key |
-- +-------------+-------------+
-- | 1           | 5           |
-- | 2           | 6           |
-- | 3           | 5           |
-- | 3           | 6           |
-- | 1           | 6           |
-- +-------------+-------------+

-- Product table:
-- +-------------+
-- | product_key |
-- +-------------+
-- | 5           |
-- | 6           |
-- +-------------+

-- Result table:
-- +-------------+
-- | customer_id |
-- +-------------+
-- | 1           |
-- | 3           |
-- +-------------+
-- The customers who bought all the products (5 and 6) are customers with id 1 and 3.

-- ======= Solution
==========

```
select customer_id
from customer
group by customer_id
having count(distinct product_key) = (select COUNT(distinct product_key) from product)
```

-- ######################################################################
-- Question 57
-- The Employee table holds all employees. Every employee has an Id, a salary, and there is also a column for the department Id.

-- +----+-------+--------+--------------+
-- | Id | Name  | Salary | DepartmentId |
-- +----+-------+--------+--------------+
-- | 1  | Joe   | 70000  | 1            |
-- | 2  | Jim   | 90000  | 1            |
-- | 3  | Henry | 80000  | 2            |
-- | 4  | Sam   | 60000  | 2            |
-- | 5  | Max   | 90000  | 1            |
-- +----+-------+--------+--------------+
-- The Department table holds all departments of the company.

-- +----+----------+
-- | Id | Name     |
-- +----+----------+
-- | 1  | IT       |
-- | 2  | Sales    |
-- +----+----------+
-- Write a SQL query to find employees who have the highest salary in each of the departments.
-- For the above tables, your SQL query should return the following rows (order of rows does not matter).

-- +------------+----------+--------+
-- | Department | Employee | Salary |
-- +------------+----------+--------+
-- | IT         | Max      | 90000  |
-- | IT         | Jim      | 90000  |
-- | Sales      | Henry    | 80000  |
-- +------------+----------+--------+
-- Explanation:

-- Max and Jim both have the highest salary in the IT department and Henry has the highest salary in the Sales department.

-- ======= Solution
================================================================================

```
select a.Department, a.Employee, a.Salary
from(
select d.name as Department, e.name as Employee, Salary,
rank() over(partition by d.name order by salary desc) as rk
from employee e
join department d
on e.departmentid = d.id) a
where a.rk=1
```

-- ######################################################################
-- Question 78

-- Table Variables:

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | name          | varchar |
-- | value         | int     |
-- +---------------+---------+
-- name is the primary key for this table.
-- This table contains the stored variables and their values.

-- Table Expressions:

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | left_operand  | varchar |
-- | operator      | enum    |
-- | right_operand | varchar |
-- +---------------+---------+
-- (left_operand, operator, right_operand) is the primary key for this table.
-- This table contains a boolean expression that should be evaluated.
-- operator is an enum that takes one of the values ('<', '>', '=')
-- The values of left_operand and right_operand are guaranteed to be in the Variables table.

-- Write an SQL query to evaluate the boolean expressions in Expressions table.

-- Return the result table in any order.

-- The query result format is in the following example.

-- Variables table:
-- +------+-------+
-- | name | value |
-- +------+-------+
-- | x    | 66    |
-- | y    | 77    |
-- +------+-------+

-- Expressions table:
-- +--------------+----------+---------------+
-- | left_operand | operator | right_operand |
-- +--------------+----------+---------------+
-- | x            | >        | y             |
-- | x            | <        | y             |
-- | x            | =        | y             |
-- | y            | >        | x             |
-- | y            | <        | x             |
-- | x            | =        | x             |

```
-- +--------------+----------+---------------+

-- Result table:
-- +--------------+----------+---------------+-------+
-- | left_operand | operator | right_operand | value |
-- +--------------+----------+---------------+-------+
-- | x            | >        | y             | false |
-- | x            | <        | y             | true  |
-- | x            | =        | y             | false |
-- | y            | >        | x             | true  |
-- | y            | <        | x             | false |
-- | x            | =        | x             | true  |
-- +--------------+----------+---------------+-------+
-- As shown, you need find the value of each boolean exprssion in the table using the variables table.

-- ======= Solution
================================================================================

with t1 as(
select e.left_operand, e.operator, e.right_operand, v.value as left_val, v_1.value as right_val
from expressions e
join variables v
on v.name = e.left_operand
join variables v_1
on v_1.name = e.right_operand)

select t1.left_operand, t1.operator, t1.right_operand,
case when t1.operator = '<' then (select t1.left_val< t1.right_val)
when t1.operator = '>' then (select t1.left_val > t1.right_val)
when t1.operator = '=' then (select t1.left_val = t1.right_val)
else FALSE
END AS VALUE
from t1



 -- ######################################################################
 -- Question 56
-- Mary is a teacher in a middle school and she has a table seat storing students' names and their corresponding seat ids.

-- The column id is continuous increment.


-- Mary wants to change seats for the adjacent students.


-- Can you write a SQL query to output the result for Mary?


-- +---------+---------+
-- |    id   | student |
-- +---------+---------+
```

```
-- |    1    | Abbot   |
-- |    2    | Doris   |
-- |    3    | Emerson |
-- |    4    | Green   |
-- |    5    | Jeames  |
-- +---------+---------+
-- For the sample input, the output is:


-- +---------+---------+
-- |    id   | student |
-- +---------+---------+
-- |    1    | Doris   |
-- |    2    | Abbot   |
-- |    3    | Green   |
-- |    4    | Emerson |
-- |    5    | Jeames  |
-- +---------+---------+

-- ======= Solution
================================================================================

select row_number() over (order by (if(id%2=1,id+1,id-1))) as id, student
from seat

 -- ##########################################################################
 -- Question 80
-- Table: Logs

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | log_id        | int     |
-- +---------------+---------+
-- id is the primary key for this table.
-- Each row of this table contains the ID in a log Table.

-- Since some IDs have been removed from Logs. Write an SQL query to find the start and end number of continuous ranges in table Logs.

-- Order the result table by start_id.

-- The query result format is in the following example:

-- Logs table:
-- +------------+
-- | log_id     |
-- +------------+
-- | 1          |
-- | 2          |
-- | 3          |
```

```
-- | 7          |
-- | 8          |
-- | 10         |
-- +------------+

-- Result table:
-- +------------+--------------+
-- | start_id   | end_id       |
-- +------------+--------------+
-- | 1          | 3            |
-- | 7          | 8            |
-- | 10         | 10           |
-- +------------+--------------+
-- The result table should contain all ranges in table Logs.
-- From 1 to 3 is contained in the table.
-- From 4 to 6 is missing in the table
-- From 7 to 8 is contained in the table.
-- Number 9 is missing in the table.
-- Number 10 is contained in the table.

-- ======= Solution
================================================================================

select min(log_id) as start_id, max(log_id) as end_id
from(
select log_id, log_id-row_number() over (order by log_id) as rk
from logs) a
group by rk

 -- ########################################################################
 -- Question 60
-- In social network like Facebook or Twitter, people send friend requests and accept others' requests as well.

-- Table request_accepted

-- +--------------+-------------+------------+
-- | requester_id | accepter_id | accept_date|
-- |--------------|-------------|------------|
-- | 1            | 2           | 2016_06-03 |
-- | 1            | 3           | 2016-06-08 |
-- | 2            | 3           | 2016-06-08 |
-- | 3            | 4           | 2016-06-09 |
-- +--------------+-------------+------------+
-- This table holds the data of friend acceptance, while requester_id and accepter_id both are the id of a person.



-- Write a query to find the the people who has most friends and the most friends number under the following rules:

-- It is guaranteed there is only 1 people having the most friends.
-- The friend request could only been accepted once, which mean there is no multiple records with the same
requester_id and accepter_id value.
```

-- For the sample data above, the result is:

-- Result table:
-- +------+------+
-- | id   | num  |
-- |------|------|
-- | 3    | 3    |
-- +------+------+
-- The person with id '3' is a friend of people '1', '2' and '4', so he has 3 friends in total, which is the most number than any others.

-- ======= Solution
==========

```
select requester_id as id, b.total as num
from(
select requester_id, sum(one) as total
from((
select requester_id, count(distinct accepter_id) as one
from request_accepted
group by requester_id)
union all
(select accepter_id, count(distinct requester_id) as two
from request_accepted
group by accepter_id)) a
group by requester_id
order by total desc) b
limit 1
```

-- ###########################################################################
-- Question 62
-- Table: Activity

-- +--------------+---------+
-- | Column Name  | Type    |
-- +--------------+---------+
-- | player_id    | int     |
-- | device_id    | int     |
-- | event_date   | date    |
-- | games_played | int     |
-- +--------------+---------+
-- (player_id, event_date) is the primary key of this table.
-- This table shows the activity of players of some game.
-- Each row is a record of a player who logged in and played a number of games (possibly 0) before logging out on some day using some device.

-- Write an SQL query that reports for each player and date, how many games played so far by the player. That is, the total number of games played by the player until that date. Check the example for clarity.

-- The query result format is in the following example:

```
-- Activity table:
-- +-----------+-----------+------------+--------------+
-- | player_id | device_id | event_date | games_played |
-- +-----------+-----------+------------+--------------+
-- | 1         | 2         | 2016-03-01 | 5            |
-- | 1         | 2         | 2016-05-02 | 6            |
-- | 1         | 3         | 2017-06-25 | 1            |
-- | 3         | 1         | 2016-03-02 | 0            |
-- | 3         | 4         | 2018-07-03 | 5            |
-- +-----------+-----------+------------+--------------+

-- Result table:
-- +-----------+------------+---------------------+
-- | player_id | event_date | games_played_so_far |
-- +-----------+------------+---------------------+
-- | 1         | 2016-03-01 | 5                   |
-- | 1         | 2016-05-02 | 11                  |
-- | 1         | 2017-06-25 | 12                  |
-- | 3         | 2016-03-02 | 0                   |
-- | 3         | 2018-07-03 | 5                   |
-- +-----------+------------+---------------------+
-- For the player with id 1, 5 + 6 = 11 games played by 2016-05-02, and 5 + 6 + 1 = 12 games played by 2017-06-25.
-- For the player with id 3, 0 + 5 = 5 games played by 2018-07-03.
-- Note that for each player we only care about the days when the player logged in.

-- ======= Solution
================================================================================

select player_id, event_date,
sum(games_played) over(partition by player_id order by event_date) as games_played_so_far
from activity
order by 1,2

 -- ######################################################################
 -- Question 91
-- Table: Activity

-- +--------------+---------+
-- | Column Name  | Type    |
-- +--------------+---------+
-- | player_id    | int     |
-- | device_id    | int     |
-- | event_date   | date    |
-- | games_played | int     |
-- +--------------+---------+
-- (player_id, event_date) is the primary key of this table.
-- This table shows the activity of players of some game.
-- Each row is a record of a player who logged in and played a number of games (possibly 0)
-- before logging out on some day using some device.
```

-- Write an SQL query that reports the fraction of players that logged in again
-- on the day after the day they first logged in, rounded to 2 decimal places.
-- In other words, you need to count the number of players that logged in for at least two consecutive
-- days starting from their first login date, then divide that number by the total number of players.

-- The query result format is in the following example:

-- Activity table:
-- +-----------+-----------+------------+--------------+
-- | player_id | device_id | event_date | games_played |
-- +-----------+-----------+------------+--------------+
-- | 1         | 2         | 2016-03-01 | 5            |
-- | 1         | 2         | 2016-03-02 | 6            |
-- | 2         | 3         | 2017-06-25 | 1            |
-- | 3         | 1         | 2016-03-02 | 0            |
-- | 3         | 4         | 2018-07-03 | 5            |
-- +-----------+-----------+------------+--------------+

-- Result table:
-- +-------------+
-- | fraction    |
-- +-------------+
-- | 0.33        |
-- +-------------+
-- Only the player with id 1 logged back in after the first day he had logged in so the answer is 1/3 = 0.33

-- ======= Solution
==========

```
With t as
(select player_id,
 min(event_date) over(partition by player_id) as min_event_date,
 case when event_date- min(event_date) over(partition by player_id) = 1 then 1
 else 0
 end as s
 from Activity)

select round(sum(t.s)/count(distinct t.player_id),2) as fraction
from t
```

-- ######################################################################
-- Question 86
-- Get the highest answer rate question from a table survey_log with these columns: id, action, question_id, answer_id, q_num, timestamp.

-- id means user id; action has these kind of values: "show", "answer", "skip"; answer_id is not null when action column is "answer",
-- while is null for "show" and "skip"; q_num is the numeral order of the question in current session.

-- Write a sql query to identify the question which has the highest answer rate.

-- Example:

-- Input:
-- +------+-----------+--------------+------------+-----------+------------+
-- | id   | action    | question_id  | answer_id  | q_num     | timestamp  |
-- +------+-----------+--------------+------------+-----------+------------+
-- | 5    | show      | 285          | null       | 1         | 123        |
-- | 5    | answer    | 285          | 124124     | 1         | 124        |
-- | 5    | show      | 369          | null       | 2         | 125        |
-- | 5    | skip      | 369          | null       | 2         | 126        |
-- +------+-----------+--------------+------------+-----------+------------+
-- Output:
-- +-------------+
-- | survey_log  |
-- +-------------+
-- |    285      |
-- +-------------+
-- Explanation:
-- question 285 has answer rate 1/1, while question 369 has 0/1 answer rate, so output 285.


-- Note: The highest answer rate meaning is: answer number's ratio in show number in the same question.

-- ======= Solution
================================================================================

with t1 as(
select a.question_id, coalesce(b.answer/a.show_1,0) as rate
from
(select question_id, coalesce(count(*),0) as show_1
from survey_log
where action != 'answer'
group by question_id) a
left join
(select question_id, coalesce(count(*),0) as answer
from survey_log
where action = 'answer'
group by question_id) b
on a.question_id = b.question_id)

select a.question_id as survey_log
from
( select t1.question_id,
rank() over(order by rate desc) as rk
from t1) a
where a.rk = 1

 -- ######################################################################
 -- Question 109
-- Table: UserActivity

```
-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | username      | varchar |
-- | activity      | varchar |
-- | startDate     | Date    |
-- | endDate       | Date    |
-- +---------------+---------+
-- This table does not contain primary key.
-- This table contain information about the activity performed of each user in a period of time.
-- A person with username performed a activity from startDate to endDate.

-- Write an SQL query to show the second most recent activity of each user.

-- If the user only has one activity, return that one.

-- A user can't perform more than one activity at the same time. Return the result table in any order.

-- The query result format is in the following example:

-- UserActivity table:
-- +------------+--------------+-------------+-------------+
-- | username   | activity     | startDate   | endDate     |
-- +------------+--------------+-------------+-------------+
-- | Alice      | Travel       | 2020-02-12  | 2020-02-20  |
-- | Alice      | Dancing      | 2020-02-21  | 2020-02-23  |
-- | Alice      | Travel       | 2020-02-24  | 2020-02-28  |
-- | Bob        | Travel       | 2020-02-11  | 2020-02-18  |
-- +------------+--------------+-------------+-------------+

-- Result table:
-- +------------+--------------+-------------+-------------+
-- | username   | activity     | startDate   | endDate     |
-- +------------+--------------+-------------+-------------+
-- | Alice      | Dancing      | 2020-02-21  | 2020-02-23  |
-- | Bob        | Travel       | 2020-02-11  | 2020-02-18  |
-- +------------+--------------+-------------+-------------+

-- The most recent activity of Alice is Travel from 2020-02-24 to 2020-02-28, before that she was dancing from 2020-02-21 to 2020-02-23.
-- Bob only has one record, we just take that one.

-- ======= Solution
================================================================================

select username, activity, startdate, enddate
from
(select *,
rank() over(partition by username order by startdate desc) as rk,
count(username) over(partition by username) as cnt
```

```
from useractivity) a
where a.rk = 2 or cnt = 1


 -- ##########################################################################
 -- Question 63
-- Table: Enrollments

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | student_id    | int     |
-- | course_id     | int     |
-- | grade         | int     |
-- +---------------+---------+
-- (student_id, course_id) is the primary key of this table.

-- Write a SQL query to find the highest grade with its corresponding course for each student. In case of a tie, you should find the course with the smallest course_id. The output must be sorted by increasing student_id.

-- The query result format is in the following example:

-- Enrollments table:
-- +------------+------------------+
-- | student_id | course_id | grade |
-- +------------+-----------+-------+
-- | 2          | 2         | 95    |
-- | 2          | 3         | 95    |
-- | 1          | 1         | 90    |
-- | 1          | 2         | 99    |
-- | 3          | 1         | 80    |
-- | 3          | 2         | 75    |
-- | 3          | 3         | 82    |
-- +------------+-----------+-------+

-- Result table:
-- +------------+------------------+
-- | student_id | course_id | grade |
-- +------------+-----------+-------+
-- | 1          | 2         | 99    |
-- | 2          | 2         | 95    |
-- | 3          | 3         | 82    |
-- +------------+-----------+-------+

-- ======= Solution
================================================================================

select student_id, course_id, grade
from(
select student_id, course_id, grade,
rank() over(partition by student_id order by grade desc, course_id) as rk
```

```
from enrollments) a
where a.rk = 1

 -- ##########################################################################
 -- Question 82
-- Table: Delivery

-- +-----------------------------+---------+
-- | Column Name                 | Type    |
-- +-----------------------------+---------+
-- | delivery_id                 | int     |
-- | customer_id                 | int     |
-- | order_date                  | date    |
-- | customer_pref_delivery_date | date    |
-- +-----------------------------+---------+
-- delivery_id is the primary key of this table.
-- The table holds information about food delivery to customers that make orders at some date and specify a preferred delivery date (on the same order date or after it).


-- If the preferred delivery date of the customer is the same as the order date then the order is called immediate otherwise it's called scheduled.

-- The first order of a customer is the order with the earliest order date that customer made. It is guaranteed that a customer has exactly one first order.

-- Write an SQL query to find the percentage of immediate orders in the first orders of all customers, rounded to 2 decimal places.

-- The query result format is in the following example:

-- Delivery table:
-- +-------------+-------------+------------+-----------------------------+
-- | delivery_id | customer_id | order_date | customer_pref_delivery_date |
-- +-------------+-------------+------------+-----------------------------+
-- | 1           | 1           | 2019-08-01 | 2019-08-02                  |
-- | 2           | 2           | 2019-08-02 | 2019-08-02                  |
-- | 3           | 1           | 2019-08-11 | 2019-08-12                  |
-- | 4           | 3           | 2019-08-24 | 2019-08-24                  |
-- | 5           | 3           | 2019-08-21 | 2019-08-22                  |
-- | 6           | 2           | 2019-08-11 | 2019-08-13                  |
-- | 7           | 4           | 2019-08-09 | 2019-08-09                  |
-- +-------------+-------------+------------+-----------------------------+

-- Result table:
-- +----------------------+
-- | immediate_percentage |
-- +----------------------+
-- | 50.00                |
-- +----------------------+
-- The customer id 1 has a first order with delivery id 1 and it is scheduled.
```

-- The customer id 2 has a first order with delivery id 2 and it is immediate.
-- The customer id 3 has a first order with delivery id 5 and it is scheduled.
-- The customer id 4 has a first order with delivery id 7 and it is immediate.
-- Hence, half the customers have immediate first orders.

-- ======= Solution
==========

```
select
round(avg(case when order_date = customer_pref_delivery_date then 1 else 0 end)*100,2) as
immediate_percentage
from
(select *,
 rank() over(partition by customer_id order by order_date) as rk
from delivery) a
where a.rk=1
```

-- ######################################################################
-- Question 96
-- Write a query to print the sum of all total investment values in 2016 (TIV_2016), to a scale of 2 decimal places, for all policy holders who meet the following criteria:

-- Have the same TIV_2015 value as one or more other policyholders.
-- Are not located in the same city as any other policyholder (i.e.: the (latitude, longitude) attribute pairs must be unique).
-- Input Format:
-- The insurance table is described as follows:

-- | Column Name | Type |
-- |---|---|
-- | PID | INTEGER(11) |
-- | TIV_2015 | NUMERIC(15,2) |
-- | TIV_2016 | NUMERIC(15,2) |
-- | LAT | NUMERIC(5,2) |
-- | LON | NUMERIC(5,2) |
-- where PID is the policyholder's policy ID, TIV_2015 is the total investment value in 2015, TIV_2016 is the total investment value in 2016, LAT is the latitude of the policy holder's city, and LON is the longitude of the policy holder's city.

-- Sample Input

-- | PID | TIV_2015 | TIV_2016 | LAT | LON |
-- |---|---|---|---|---|
-- | 1 | 10 | 5 | 10 | 10 |
-- | 2 | 20 | 20 | 20 | 20 |
-- | 3 | 10 | 30 | 20 | 20 |
-- | 4 | 10 | 40 | 40 | 40 |
-- Sample Output

-- | TIV_2016 |
-- |---|

-- | 45.00    |
-- Explanation

-- The first record in the table, like the last record, meets both of the two criteria.
-- The TIV_2015 value '10' is as the same as the third and forth record, and its location unique.

-- The second record does not meet any of the two criteria. Its TIV_2015 is not like any other policyholders.

-- And its location is the same with the third record, which makes the third record fail, too.

-- So, the result is the sum of TIV_2016 of the first and last record, which is 45.

-- ======= Solution
==========

```
select sum(TIV_2016) TIV_2016
from
(select *, count(*) over (partition by TIV_2015) as c1, count(*) over (partition by LAT, LON) as c2
from insurance ) t
where c1 > 1 and c2 = 1;
```

-- ##########################################################################
-- Question 68
-- Table: Queue

-- +-------------+---------+
-- | Column Name | Type    |
-- +-------------+---------+
-- | person_id   | int     |
-- | person_name | varchar |
-- | weight      | int     |
-- | turn        | int     |
-- +-------------+---------+
-- person_id is the primary key column for this table.
-- This table has the information about all people waiting for an elevator.
-- The person_id and turn columns will contain all numbers from 1 to n, where n is the number of rows in the table.

-- The maximum weight the elevator can hold is 1000.

-- Write an SQL query to find the person_name of the last person who will fit in the elevator without exceeding the weight limit. It is guaranteed that the person who is first in the queue can fit in the elevator.

-- The query result format is in the following example:

-- Queue table
-- +-----------+-------------------+--------+------+
-- | person_id | person_name       | weight | turn |
-- +-----------+-------------------+--------+------+
-- | 5         | George Washington | 250    | 1    |
-- | 3         | John Adams        | 350    | 2    |

```
-- | 6        | Thomas Jefferson  | 400    | 3    |
-- | 2        | Will Johnliams    | 200    | 4    |
-- | 4        | Thomas Jefferson  | 175    | 5    |
-- | 1        | James Elephant    | 500    | 6    |
-- +-----------+------------------+--------+------+

-- Result table
-- +-------------------+
-- | person_name       |
-- +-------------------+
-- | Thomas Jefferson  |
-- +-------------------+

-- Queue table is ordered by turn in the example for simplicity.
-- In the example George Washington(id 5), John Adams(id 3) and Thomas Jefferson(id 6) will enter the elevator as their weight sum is 250 + 350 + 400 = 1000.
-- Thomas Jefferson(id 6) is the last person to fit in the elevator because he has the last turn in these three people.
-- ======= Solution
================================================================================

With t1 as
(
select *,
sum(weight) over(order by turn) as cum_weight
from queue
order by turn)

select t1.person_name
from t1
where turn = (select max(turn) from t1 where t1.cum_weight<=1000)



 -- ######################################################################
 -- Question 75
-- The Employee table holds all employees including their managers. Every employee has an Id, and there is also a column for the manager Id.

-- +------+----------+-----------+----------+
-- |Id    |Name      |Department |ManagerId |
-- +------+----------+-----------+----------+
-- |101   |John      |A          |null      |
-- |102   |Dan       |A          |101       |
-- |103   |James             |A          |101       |
-- |104   |Amy       |A          |101       |
-- |105   |Anne      |A          |101       |
-- |106   |Ron       |B          |101       |
-- +------+----------+-----------+----------+
-- Given the Employee table, write a SQL query that finds out managers with at least 5 direct report. For the above table, your SQL query should return:
```

```
-- +-------+
-- | Name  |
-- +-------+
-- | John  |
-- +-------+
-- Note:
-- No one would report to himself.

-- ======= Solution
================================================================================

with t1 as
(
   select managerid, count(name) as total
   from employee
   group by managerid
)

select e.name
from t1
join employee e
on t1.managerid = e.id
where t1.total>=5

 -- ########################################################################
 -- Question 69
-- Table: Users

-- +----------------+---------+
-- | Column Name    | Type    |
-- +----------------+---------+
-- | user_id        | int     |
-- | join_date      | date    |
-- | favorite_brand | varchar |
-- +----------------+---------+
-- user_id is the primary key of this table.
-- This table has the info of the users of an online shopping website where users can sell and buy items.
-- Table: Orders

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | order_id      | int     |
-- | order_date    | date    |
-- | item_id       | int     |
-- | buyer_id      | int     |
-- | seller_id     | int     |
-- +---------------+---------+
-- order_id is the primary key of this table.
-- item_id is a foreign key to the Items table.
-- buyer_id and seller_id are foreign keys to the Users table.
```

-- Table: Items

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | item_id       | int     |
-- | item_brand    | varchar |
-- +---------------+---------+
-- item_id is the primary key of this table.


-- Write an SQL query to find for each user, the join date and the number of orders they made as a buyer in 2019.

-- The query result format is in the following example:

-- Users table:
-- +---------+------------+----------------+
-- | user_id | join_date  | favorite_brand |
-- +---------+------------+----------------+
-- | 1       | 2018-01-01 | Lenovo         |
-- | 2       | 2018-02-09 | Samsung        |
-- | 3       | 2018-01-19 | LG             |
-- | 4       | 2018-05-21 | HP             |
-- +---------+------------+----------------+

-- Orders table:
-- +----------+------------+---------+----------+-----------+
-- | order_id | order_date | item_id | buyer_id | seller_id |
-- +----------+------------+---------+----------+-----------+
-- | 1        | 2019-08-01 | 4       | 1        | 2         |
-- | 2        | 2018-08-02 | 2       | 1        | 3         |
-- | 3        | 2019-08-03 | 3       | 2        | 3         |
-- | 4        | 2018-08-04 | 1       | 4        | 2         |
-- | 5        | 2018-08-04 | 1       | 3        | 4         |
-- | 6        | 2019-08-05 | 2       | 2        | 4         |
-- +----------+------------+---------+----------+-----------+

-- Items table:
-- +---------+------------+
-- | item_id | item_brand |
-- +---------+------------+
-- | 1       | Samsung    |
-- | 2       | Lenovo     |
-- | 3       | LG         |
-- | 4       | HP         |
-- +---------+------------+

-- Result table:
-- +-----------+------------+----------------+
-- | buyer_id  | join_date  | orders_in_2019 |
-- +-----------+------------+----------------+

```
-- | 1       | 2018-01-01 | 1           |
-- | 2       | 2018-02-09 | 2           |
-- | 3       | 2018-01-19 | 0           |
-- | 4       | 2018-05-21 | 0           |
-- +-----------+------------+---------------+

-- ======= Solution
================================================================================

select user_id as buyer_id, join_date, coalesce(a.orders_in_2019,0)
from users
left join
(
select buyer_id, coalesce(count(*), 0) as orders_in_2019
from orders o
join users u
on u.user_id = o.buyer_id
where extract('year'from order_date) = 2019
group by buyer_id) a
on users.user_id = a.buyer_id

 -- ########################################################################
 -- Question 95
-- Table: Transactions

-- +----------------+---------+
-- | Column Name    | Type    |
-- +----------------+---------+
-- | id            | int     |
-- | country       | varchar |
-- | state         | enum    |
-- | amount        | int     |
-- | trans_date    | date    |
-- +----------------+---------+
-- id is the primary key of this table.
-- The table has information about incoming transactions.
-- The state column is an enum of type ["approved", "declined"].
-- Table: Chargebacks

-- +----------------+---------+
-- | Column Name    | Type    |
-- +----------------+---------+
-- | trans_id      | int     |
-- | charge_date   | date    |
-- +----------------+---------+
-- Chargebacks contains basic information regarding incoming chargebacks from some transactions placed in
Transactions table.
-- trans_id is a foreign key to the id column of Transactions table.
-- Each chargeback corresponds to a transaction made previously even if they were not approved.
```

-- Write an SQL query to find for each month and country, the number of approved transactions and their total amount, the number of chargebacks and their total amount.

-- Note: In your query, given the month and country, ignore rows with all zeros.

-- The query result format is in the following example:

-- Transactions table:
-- +------+---------+----------+--------+------------+
-- | id   | country | state    | amount | trans_date |
-- +------+---------+----------+--------+------------+
-- | 101  | US      | approved | 1000   | 2019-05-18 |
-- | 102  | US      | declined | 2000   | 2019-05-19 |
-- | 103  | US      | approved | 3000   | 2019-06-10 |
-- | 104  | US      | approved | 4000   | 2019-06-13 |
-- | 105  | US      | approved | 5000   | 2019-06-15 |
-- +------+---------+----------+--------+------------+

-- Chargebacks table:
-- +------------+------------+
-- | trans_id   | trans_date |
-- +------------+------------+
-- | 102        | 2019-05-29 |
-- | 101        | 2019-06-30 |
-- | 105        | 2019-09-18 |
-- +------------+------------+

-- Result table:
-- +----------+---------+----------------+-----------------+-------------------+--------------------+
-- | month    | country | approved_count | approved_amount | chargeback_count  | chargeback_amount  |
-- +----------+---------+----------------+-----------------+-------------------+--------------------+
-- | 2019-05  | US      | 1              | 1000            | 1                 | 2000               |
-- | 2019-06  | US      | 3              | 12000           | 1                 | 1000               |
-- | 2019-09  | US      | 0              | 0               | 1                 | 5000               |
-- +----------+---------+----------------+-----------------+-------------------+--------------------+

-- ======= Solution
==========

```
with t1 as
(select country, extract('month' from trans_date), state, count(*) as approved_count, sum(amount) as
approved_amount
from transactions
where state = 'approved'
group by 1, 2, 3),
t2 as(
select t.country, extract('month' from c.trans_date), sum(amount) as chargeback_amount, count(*) as
chargeback_count
from chargebacks c left join transactions t
on trans_id = id
group by t.country, extract('month' from c.trans_date)),
```

```
t3 as(
select t2.date_part, t2.country, coalesce(approved_count,0) as approved_count, coalesce(approved_amount,0) as
approved_amount, coalesce(chargeback_count,0) as chargeback_count, coalesce(chargeback_amount,0) as
chargeback_amount
from t2 left join t1
on t2.date_part = t1.date_part and t2.country = t1.country),

t4 as(
select t1.date_part, t1.country, coalesce(approved_count,0) as approved_count, coalesce(approved_amount,0) as
approved_amount, coalesce(chargeback_count,0) as chargeback_count, coalesce(chargeback_amount,0) as
chargeback_amount
from t2 right join t1
on t2.date_part = t1.date_part and t2.country = t1.country)

select *
from t3
union
select *
from t4

 -- ######################################################################
 -- Question 83
-- Table: Transactions

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | id            | int     |
-- | country       | varchar |
-- | state         | enum    |
-- | amount        | int     |
-- | trans_date    | date    |
-- +---------------+---------+
-- id is the primary key of this table.
-- The table has information about incoming transactions.
-- The state column is an enum of type ["approved", "declined"].


-- Write an SQL query to find for each month and country, the number of transactions and their total amount, the
number of approved transactions and their total amount.

-- The query result format is in the following example:

-- Transactions table:
-- +------+---------+----------+--------+------------+
-- | id   | country | state    | amount | trans_date |
-- +------+---------+----------+--------+------------+
-- | 121  | US      | approved | 1000   | 2018-12-18 |
-- | 122  | US      | declined | 2000   | 2018-12-19 |
-- | 123  | US      | approved | 2000   | 2019-01-01 |
```

```
-- | 124  | DE      | approved | 2000   | 2019-01-07 |
-- +------+---------+----------+--------+------------+

-- Result table:
-- +----------+---------+-------------+---------------+-------------------+----------------------+
-- | month    | country | trans_count | approved_count | trans_total_amount | approved_total_amount |
-- +----------+---------+-------------+---------------+-------------------+----------------------+
-- | 2018-12  | US      | 2           | 1             | 3000              | 1000                 |
-- | 2019-01  | US      | 1           | 1             | 2000              | 2000                 |
-- | 2019-01  | DE      | 1           | 1             | 2000              | 2000                 |
-- +----------+---------+-------------+---------------+-------------------+----------------------+

-- ======= Solution
================================================================================

with t1 as(
select DATE_FORMAT(trans_date,'%Y-%m') as month, country, count(state) as trans_count, sum(amount) as
trans_total_amount
from transactions
group by country, month(trans_date)),

t2 as (
Select DATE_FORMAT(trans_date,'%Y-%m') as month, country, count(state) as approved_count, sum(amount) as
approved_total_amount
from transactions
where state = 'approved'
group by country, month(trans_date))

select t1.month, t1.country, coalesce(t1.trans_count,0) as trans_count, coalesce(t2.approved_count,0) as
approved_count, coalesce(t1.trans_total_amount,0) as trans_total_amount, coalesce(t2.approved_total_amount,0) as
approved_total_amount
from t1 left join t2
on t1.country = t2.country and t1.month = t2.month

 -- ######################################################################
 -- Question 59
-- Table: Movies

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | movie_id      | int     |
-- | title         | varchar |
-- +---------------+---------+
-- movie_id is the primary key for this table.
-- title is the name of the movie.
-- Table: Users

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
```

```
-- | user_id       | int     |
-- | name          | varchar |
-- +---------------+---------+
-- user_id is the primary key for this table.
-- Table: Movie_Rating

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | movie_id      | int     |
-- | user_id       | int     |
-- | rating        | int     |
-- | created_at    | date    |
-- +---------------+---------+
-- (movie_id, user_id) is the primary key for this table.
-- This table contains the rating of a movie by a user in their review.
-- created_at is the user's review date.


-- Write the following SQL query:

-- Find the name of the user who has rated the greatest number of the movies.
-- In case of a tie, return lexicographically smaller user name.

-- Find the movie name with the highest average rating in February 2020.
-- In case of a tie, return lexicographically smaller movie name.

-- Query is returned in 2 rows, the query result format is in the folowing example:

-- Movies table:
-- +-------------+--------------+
-- | movie_id    |  title       |
-- +-------------+--------------+
-- | 1           | Avengers     |
-- | 2           | Frozen 2     |
-- | 3           | Joker        |
-- +-------------+--------------+

-- Users table:
-- +-------------+--------------+
-- | user_id     |  name        |
-- +-------------+--------------+
-- | 1           | Daniel       |
-- | 2           | Monica       |
-- | 3           | Maria        |
-- | 4           | James        |
-- +-------------+--------------+

-- Movie_Rating table:
-- +-------------+--------------+--------------+-------------+
-- | movie_id    | user_id      | rating       | created_at  |
```

```
-- +-------------+--------------+--------------+-------------+
-- | 1           | 1            | 3            | 2020-01-12  |
-- | 1           | 2            | 4            | 2020-02-11  |
-- | 1           | 3            | 2            | 2020-02-12  |
-- | 1           | 4            | 1            | 2020-01-01  |
-- | 2           | 1            | 5            | 2020-02-17  |
-- | 2           | 2            | 2            | 2020-02-01  |
-- | 2           | 3            | 2            | 2020-03-01  |
-- | 3           | 1            | 3            | 2020-02-22  |
-- | 3           | 2            | 4            | 2020-02-25  |
-- +-------------+--------------+--------------+-------------+

-- Result table:
-- +--------------+
-- | results      |
-- +--------------+
-- | Daniel       |
-- | Frozen 2     |
-- +--------------+

-- Daniel and Maria have rated 3 movies ("Avengers", "Frozen 2" and "Joker") but Daniel is smaller lexicographically.
-- Frozen 2 and Joker have a rating average of 3.5 in February but Frozen 2 is smaller lexicographically.

-- ======= Solution
================================================================================

select name as results
from(
(select a.name
from(
select name, count(*),
rank() over(order by count(*) desc) as rk
from movie_rating m
join users u
on m.user_id = u.user_id
group by name, m.user_id
order by rk, name) a
limit 1)
union
(select title
from(
select title, round(avg(rating),1) as rnd
from movie_rating m
join movies u
on m.movie_id = u.movie_id
where month(created_at) = 2
group by title
order by rnd desc, title) b
limit 1)) as d

 -- ######################################################################
```

```
-- Question 92
-- Table: Traffic

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | user_id       | int     |
-- | activity      | enum    |
-- | activity_date | date    |
-- +---------------+---------+
-- There is no primary key for this table, it may have duplicate rows.
-- The activity column is an ENUM type of ('login', 'logout', 'jobs', 'groups', 'homepage').


-- Write an SQL query that reports for every date within at most 90 days from today,
-- the number of users that logged in for the first time on that date. Assume today is 2019-06-30.

-- The query result format is in the following example:

-- Traffic table:
-- +---------+----------+---------------+
-- | user_id | activity | activity_date |
-- +---------+----------+---------------+
-- | 1       | login    | 2019-05-01    |
-- | 1       | homepage | 2019-05-01    |
-- | 1       | logout   | 2019-05-01    |
-- | 2       | login    | 2019-06-21    |
-- | 2       | logout   | 2019-06-21    |
-- | 3       | login    | 2019-01-01    |
-- | 3       | jobs     | 2019-01-01    |
-- | 3       | logout   | 2019-01-01    |
-- | 4       | login    | 2019-06-21    |
-- | 4       | groups   | 2019-06-21    |
-- | 4       | logout   | 2019-06-21    |
-- | 5       | login    | 2019-03-01    |
-- | 5       | logout   | 2019-03-01    |
-- | 5       | login    | 2019-06-21    |
-- | 5       | logout   | 2019-06-21    |
-- +---------+----------+---------------+

-- Result table:
-- +------------+-------------+
-- | login_date | user_count  |
-- +------------+-------------+
-- | 2019-05-01 | 1           |
-- | 2019-06-21 | 2           |
-- +------------+-------------+
-- Note that we only care about dates with non zero user count.
-- The user with id 5 first logged in on 2019-03-01 so he's not counted on 2019-06-21.
```

```
-- ======= Solution
================================================================================

with t1 as
(
   select user_id, min(activity_date) as login_date
   from Traffic
   where activity = 'login'
   group by user_id
)

select login_date, count(distinct user_id) as user_count
from t1
where login_date between '2019-04-01' and '2019-06-30'
group by login_date

 -- ##########################################################################
 -- Question 54
-- Table: NPV

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | id            | int     |
-- | year          | int     |
-- | npv           | int     |
-- +---------------+---------+
-- (id, year) is the primary key of this table.
-- The table has information about the id and the year of each inventory and the corresponding net present value.


-- Table: Queries

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | id            | int     |
-- | year          | int     |
-- +---------------+---------+
-- (id, year) is the primary key of this table.
-- The table has information about the id and the year of each inventory query.


-- Write an SQL query to find the npv of all each query of queries table.

-- Return the result table in any order.

-- The query result format is in the following example:

-- NPV table:
-- +------+--------+--------+
```

```
-- | id   | year   | npv    |
-- +------+--------+--------+
-- | 1    | 2018   | 100    |
-- | 7    | 2020   | 30     |
-- | 13   | 2019   | 40     |
-- | 1    | 2019   | 113    |
-- | 2    | 2008   | 121    |
-- | 3    | 2009   | 12     |
-- | 11   | 2020   | 99     |
-- | 7    | 2019   | 0      |
-- +------+--------+--------+

-- Queries table:
-- +------+--------+
-- | id   | year   |
-- +------+--------+
-- | 1    | 2019   |
-- | 2    | 2008   |
-- | 3    | 2009   |
-- | 7    | 2018   |
-- | 7    | 2019   |
-- | 7    | 2020   |
-- | 13   | 2019   |
-- +------+--------+

-- Result table:
-- +------+--------+--------+
-- | id   | year   | npv    |
-- +------+--------+--------+
-- | 1    | 2019   | 113    |
-- | 2    | 2008   | 121    |
-- | 3    | 2009   | 12     |
-- | 7    | 2018   | 0      |
-- | 7    | 2019   | 0      |
-- | 7    | 2020   | 30     |
-- | 13   | 2019   | 40     |
-- +------+--------+--------+

-- The npv value of (7, 2018) is not present in the NPV table, we consider it 0.
-- The npv values of all other queries can be found in the NPV table.

-- ======= Solution
================================================================================

select q.id, q.year, coalesce(n.npv,0) as npv
from queries q
left join npv n
on q.id = n.id and q.year=n.year


 -- ######################################################################
```

-- Question 50
-- Write a SQL query to get the nth highest salary from the Employee table.

-- +----+--------+
-- | Id | Salary |
-- +----+--------+
-- | 1  | 100    |
-- | 2  | 200    |
-- | 3  | 300    |
-- +----+--------+
-- For example, given the above Employee table, the nth highest salary where n = 2 is 200. If there is no nth highest salary, then the query should return null.

-- +------------------------+
-- | getNthHighestSalary(2) |
-- +------------------------+
-- | 200                    |
-- +------------------------+

-- ======= Solution
================================================================================

```
CREATE FUNCTION getNthHighestSalary(N INT) RETURNS INT
BEGIN
  RETURN (
      # Write your MySQL query statement below.
      select distinct a.salary
      from
      (select salary,
      dense_rank() over(order by salary desc) as rk
      from Employee) a
      where a.rk = N
  );
END
```

-- ######################################################################
-- Question 84
-- Table: Friendship

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | user1_id      | int     |
-- | user2_id      | int     |
-- +---------------+---------+
-- (user1_id, user2_id) is the primary key for this table.
-- Each row of this table indicates that there is a friendship relation between user1_id and user2_id.

-- Table: Likes

```
-- +-------------+---------+
-- | Column Name | Type    |
-- +-------------+---------+
-- | user_id     | int     |
-- | page_id     | int     |
-- +-------------+---------+
-- (user_id, page_id) is the primary key for this table.
-- Each row of this table indicates that user_id likes page_id.


-- Write an SQL query to recommend pages to the user with user_id = 1 using the pages that your friends liked. It should not recommend pages you already liked.

-- Return result table in any order without duplicates.

-- The query result format is in the following example:

-- Friendship table:
-- +----------+----------+
-- | user1_id | user2_id |
-- +----------+----------+
-- | 1        | 2        |
-- | 1        | 3        |
-- | 1        | 4        |
-- | 2        | 3        |
-- | 2        | 4        |
-- | 2        | 5        |
-- | 6        | 1        |
-- +----------+----------+

-- Likes table:
-- +---------+---------+
-- | user_id | page_id |
-- +---------+---------+
-- | 1       | 88      |
-- | 2       | 23      |
-- | 3       | 24      |
-- | 4       | 56      |
-- | 5       | 11      |
-- | 6       | 33      |
-- | 2       | 77      |
-- | 3       | 77      |
-- | 6       | 88      |
-- +---------+---------+

-- Result table:
-- +-----------------+
-- | recommended_page |
-- +-----------------+
-- | 23              |
-- | 24              |
```

-- | 56 |
-- | 33 |
-- | 77 |
-- +------------------+
-- User one is friend with users 2, 3, 4 and 6.
-- Suggested pages are 23 from user 2, 24 from user 3, 56 from user 3 and 33 from user 6.
-- Page 77 is suggested from both user 2 and user 3.
-- Page 88 is not suggested because user 1 already likes it.

-- ======= Solution
==========================================================================================

```
select distinct page_id as recommended_page
from likes
where user_id =
any(select user2_id as id
from friendship
where user1_id = 1 or user2_id = 1 and user2_id !=1
union all
select user1_id
from friendship
where user2_id = 1)
and page_id != all(select page_id from likes where user_id = 1)
```

-- ##########################################################################
-- Question 67
-- Table: Products

-- +---------------+---------+
-- | Column Name | Type |
-- +---------------+---------+
-- | product_id | int |
-- | new_price | int |
-- | change_date | date |
-- +---------------+---------+
-- (product_id, change_date) is the primary key of this table.
-- Each row of this table indicates that the price of some product was changed to a new price at some date.

-- Write an SQL query to find the prices of all products on 2019-08-16. Assume the price of all products before any change is 10.

-- The query result format is in the following example:

-- Products table:
-- +------------+-----------+-------------+
-- | product_id | new_price | change_date |
-- +------------+-----------+-------------+
-- | 1 | 20 | 2019-08-14 |
-- | 2 | 50 | 2019-08-14 |
-- | 1 | 30 | 2019-08-15 |

```
-- | 1          | 35       | 2019-08-16  |
-- | 2          | 65       | 2019-08-17  |
-- | 3          | 20       | 2019-08-18  |
-- +------------+----------+-------------+

-- Result table:
-- +------------+-------+
-- | product_id | price |
-- +------------+-------+
-- | 2          | 50    |
-- | 1          | 35    |
-- | 3          | 10    |
-- +------------+-------+

-- ======= Solution
================================================================================

with t1 as (
select a.product_id, new_price
from(
Select product_id, max(change_date) as date
from products
where change_date<='2019-08-16'
group by product_id) a
join products p
on a.product_id = p.product_id and a.date = p.change_date),

t2 as (
select distinct product_id
            from products)

select t2.product_id, coalesce(new_price,10) as price
from t2 left join t1
on t2.product_id = t1.product_id
order by price desc

 -- ##########################################################################
 -- Question 90
-- Table: Sales

-- +-------------+-------+
-- | Column Name | Type  |
-- +-------------+-------+
-- | sale_id     | int   |
-- | product_id  | int   |
-- | year        | int   |
-- | quantity    | int   |
-- | price       | int   |
-- +-------------+-------+
-- sale_id is the primary key of this table.
-- product_id is a foreign key to Product table.
```

-- Note that the price is per unit.
-- Table: Product

-- +--------------+---------+
-- | Column Name  | Type    |
-- +--------------+---------+
-- | product_id   | int     |
-- | product_name | varchar |
-- +--------------+---------+
-- product_id is the primary key of this table.


-- Write an SQL query that selects the product id, year, quantity, and price for the first year of every product sold.

-- The query result format is in the following example:

-- Sales table:
-- +---------+------------+------+----------+-------+
-- | sale_id | product_id | year | quantity | price |
-- +---------+------------+------+----------+-------+
-- | 1       | 100        | 2008 | 10       | 5000  |
-- | 2       | 100        | 2009 | 12       | 5000  |
-- | 7       | 200        | 2011 | 15       | 9000  |
-- +---------+------------+------+----------+-------+

-- Product table:
-- +------------+--------------+
-- | product_id | product_name |
-- +------------+--------------+
-- | 100        | Nokia        |
-- | 200        | Apple        |
-- | 300        | Samsung      |
-- +------------+--------------+

-- Result table:
-- +------------+------------+----------+-------+
-- | product_id | first_year | quantity | price |
-- +------------+------------+----------+-------+
-- | 100        | 2008       | 10       | 5000  |
-- | 200        | 2011       | 15       | 9000  |
-- +------------+------------+----------+-------+

-- ======= Solution
==========================================================================================

```
select a.product_id, a.year as first_year, a.quantity, a.price
from
( select product_id, quantity, price, year,
  rank() over(partition by product_id order by year) as rk
  from sales
) a
```

```
where a.rk = 1

 -- ##########################################################################
 -- Question 85
-- Table: Project

-- +-------------+---------+
-- | Column Name | Type    |
-- +-------------+---------+
-- | project_id  | int     |
-- | employee_id | int     |
-- +-------------+---------+
-- (project_id, employee_id) is the primary key of this table.
-- employee_id is a foreign key to Employee table.
-- Table: Employee

-- +------------------+---------+
-- | Column Name      | Type    |
-- +------------------+---------+
-- | employee_id      | int     |
-- | name             | varchar |
-- | experience_years | int     |
-- +------------------+---------+
-- employee_id is the primary key of this table.


-- Write an SQL query that reports the most experienced employees in each project.
-- In case of a tie, report all employees with the maximum number of experience years.

-- The query result format is in the following example:

-- Project table:
-- +-------------+-------------+
-- | project_id  | employee_id |
-- +-------------+-------------+
-- | 1           | 1           |
-- | 1           | 2           |
-- | 1           | 3           |
-- | 2           | 1           |
-- | 2           | 4           |
-- +-------------+-------------+

-- Employee table:
-- +-------------+--------+------------------+
-- | employee_id | name   | experience_years |
-- +-------------+--------+------------------+
-- | 1           | Khaled | 3                |
-- | 2           | Ali    | 2                |
-- | 3           | John   | 3                |
-- | 4           | Doe    | 2                |
-- +-------------+--------+------------------+
```

```
-- Result table:
-- +-------------+---------------+
-- | project_id  | employee_id   |
-- +-------------+---------------+
-- | 1           | 1             |
-- | 1           | 3             |
-- | 2           | 1             |
-- +-------------+---------------+
-- Both employees with id 1 and 3 have the
-- most experience among the employees of the first project. For the second project, the employee with id 1 has the most experience.

-- ======= Solution
================================================================================

with t1 as(
select p.project_id, p.employee_id, e.experience_years,
rank() over(partition by project_id order by experience_years desc) as rk
from project p
join employee e
on p.employee_id = e.employee_id)

select t1.project_id, t1.employee_id
from t1
where t1.rk = 1



 -- ##########################################################################
 -- Question 51
-- Write a SQL query to rank scores.
-- If there is a tie between two scores, both should have the same ranking.
-- Note that after a tie, the next ranking number should be the next consecutive integer value.
-- In other words, there should be no "holes" between ranks.

-- +----+-------+
-- | Id | Score |
-- +----+-------+
-- | 1  | 3.50  |
-- | 2  | 3.65  |
-- | 3  | 4.00  |
-- | 4  | 3.85  |
-- | 5  | 4.00  |
-- | 6  | 3.65  |
-- +----+-------+
-- For example, given the above Scores table, your query should generate the following report (order by highest score):

-- +-------+---------+
-- | score | Rank    |
-- +-------+---------+
-- | 4.00  | 1       |
```

-- | 4.00  | 1    |
-- | 3.85  | 2    |
-- | 3.65  | 3    |
-- | 3.65  | 3    |
-- | 3.50  | 4    |
-- +-------+------+
-- Important Note: For MySQL solutions, to escape reserved words used as column names,
-- you can use an apostrophe before and after the keyword. For example `Rank`.

-- ======= Solution
==========

select Score,
dense_rank() over(order by score desc) as "Rank"
from scores

 -- ##########################################################################
 -- Question 79
-- Table: Points

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | id            | int     |
-- | x_value       | int     |
-- | y_value       | int     |
-- +---------------+---------+
-- id is the primary key for this table.
-- Each point is represented as a 2D Dimensional (x_value, y_value).
-- Write an SQL query to report of all possible rectangles which can be formed by any two points of the table.

-- Each row in the result contains three columns (p1, p2, area) where:

-- p1 and p2 are the id of two opposite corners of a rectangle and p1 < p2.
-- Area of this rectangle is represented by the column area.
-- Report the query in descending order by area in case of tie in ascending order by p1 and p2.

-- Points table:
-- +----------+-------------+-------------+
-- | id       | x_value     | y_value     |
-- +----------+-------------+-------------+
-- | 1        | 2           | 8           |
-- | 2        | 4           | 7           |
-- | 3        | 2           | 10          |
-- +----------+-------------+-------------+

-- Result table:
-- +----------+-------------+-------------+
-- | p1       | p2          | area        |
-- +----------+-------------+-------------+
-- | 2        | 3           | 6           |

-- | 1 | 2 | 2 |
-- +----------+-------------+-------------+

-- p1 should be less than p2 and area greater than 0.
-- p1 = 1 and p2 = 2, has an area equal to |2-4| * |8-7| = 2.
-- p1 = 2 and p2 = 3, has an area equal to |4-2| * |7-10| = 6.
-- p1 = 1 and p2 = 3 It's not possible because the rectangle has an area equal to 0.

-- ======= Solution
==========

select p1.id as p1, p2.id as p2, abs(p1.x_value-p2.x_value)*abs(p1.y_value-p2.y_value) as area
from points p1 cross join points p2
where p1.x_value!=p2.x_value and p1.y_value!=p2.y_value and p1.id<p2.id
order by area desc, p1, p2

-- ##########################################################################
-- Question 73
-- Table: Actions

-- +---------------+---------+
-- | Column Name | Type |
-- +---------------+---------+
-- | user_id | int |
-- | post_id | int |
-- | action_date | date |
-- | action | enum |
-- | extra | varchar |
-- +---------------+---------+
-- There is no primary key for this table, it may have duplicate rows.
-- The action column is an ENUM type of ('view', 'like', 'reaction', 'comment', 'report', 'share').
-- The extra column has optional information about the action such as a reason for report or a type of reaction.
-- Table: Removals

-- +---------------+---------+
-- | Column Name | Type |
-- +---------------+---------+
-- | post_id | int |
-- | remove_date | date |
-- +---------------+---------+
-- post_id is the primary key of this table.
-- Each row in this table indicates that some post was removed as a result of being reported or as a result of an admin review.

-- Write an SQL query to find the average for daily percentage of posts that got removed after being reported as spam, rounded to 2 decimal places.

-- The query result format is in the following example:

-- Actions table:

```
-- +---------+---------+-------------+--------+--------+
-- | user_id | post_id | action_date | action | extra  |
-- +---------+---------+-------------+--------+--------+
-- | 1       | 1       | 2019-07-01  | view   | null   |
-- | 1       | 1       | 2019-07-01  | like   | null   |
-- | 1       | 1       | 2019-07-01  | share  | null   |
-- | 2       | 2       | 2019-07-04  | view   | null   |
-- | 2       | 2       | 2019-07-04  | report | spam   |
-- | 3       | 4       | 2019-07-04  | view   | null   |
-- | 3       | 4       | 2019-07-04  | report | spam   |
-- | 4       | 3       | 2019-07-02  | view   | null   |
-- | 4       | 3       | 2019-07-02  | report | spam   |
-- | 5       | 2       | 2019-07-03  | view   | null   |
-- | 5       | 2       | 2019-07-03  | report | racism |
-- | 5       | 5       | 2019-07-03  | view   | null   |
-- | 5       | 5       | 2019-07-03  | report | racism |
-- +---------+---------+-------------+--------+--------+

-- Removals table:
-- +---------+-------------+
-- | post_id | remove_date |
-- +---------+-------------+
-- | 2       | 2019-07-20  |
-- | 3       | 2019-07-18  |
-- +---------+-------------+

-- Result table:
-- +-----------------------+
-- | average_daily_percent |
-- +-----------------------+
-- | 75.00                 |
-- +-----------------------+
-- The percentage for 2019-07-04 is 50% because only one post of two spam reported posts was removed.
-- The percentage for 2019-07-02 is 100% because one post was reported as spam and it was removed.
-- The other days had no spam reports so the average is (50 + 100) / 2 = 75%
-- Note that the output is only one number and that we do not care about the remove dates.

-- ======= Solution
================================================================================

with t1 as(
select a.action_date, (count(distinct r.post_id)+0.0)/(count(distinct a.post_id)+0.0) as result
from (select action_date, post_id
from actions
where extra = 'spam' and action = 'report') a
left join
removals r
on a.post_id = r.post_id
group by a.action_date)

select round(avg(t1.result)*100,2) as  average_daily_percent
```

from t1

-- ##########################################################################
-- Question 71
-- Table: Customer

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | customer_id   | int     |
-- | name          | varchar |
-- | visited_on    | date    |
-- | amount        | int     |
-- +---------------+---------+
-- (customer_id, visited_on) is the primary key for this table.
-- This table contains data about customer transactions in a restaurant.
-- visited_on is the date on which the customer with ID (customer_id) have visited the restaurant.
-- amount is the total paid by a customer.

-- You are the restaurant owner and you want to analyze a possible expansion (there will be at least one customer every day).

-- Write an SQL query to compute moving average of how much customer paid in a 7 days window (current day + 6 days before) .

-- The query result format is in the following example:

-- Return result table ordered by visited_on.

-- average_amount should be rounded to 2 decimal places, all dates are in the format ('YYYY-MM-DD').

-- Customer table:
-- +-------------+--------------+--------------+-------------+
-- | customer_id | name         | visited_on   | amount      |
-- +-------------+--------------+--------------+-------------+
-- | 1           | Jhon         | 2019-01-01   | 100         |
-- | 2           | Daniel       | 2019-01-02   | 110         |
-- | 3           | Jade         | 2019-01-03   | 120         |
-- | 4           | Khaled       | 2019-01-04   | 130         |
-- | 5           | Winston      | 2019-01-05   | 110         |
-- | 6           | Elvis        | 2019-01-06   | 140         |
-- | 7           | Anna         | 2019-01-07   | 150         |
-- | 8           | Maria        | 2019-01-08   | 80          |
-- | 9           | Jaze         | 2019-01-09   | 110         |
-- | 1           | Jhon         | 2019-01-10   | 130         |
-- | 3           | Jade         | 2019-01-10   | 150         |
-- +-------------+--------------+--------------+-------------+

```
-- Result table:
-- +--------------+--------------+----------------+
-- | visited_on   | amount       | average_amount |
-- +--------------+--------------+----------------+
-- | 2019-01-07   | 860          | 122.86         |
-- | 2019-01-08   | 840          | 120            |
-- | 2019-01-09   | 840          | 120            |
-- | 2019-01-10   | 1000         | 142.86         |
-- +--------------+--------------+----------------+

-- 1st moving average from 2019-01-01 to 2019-01-07 has an average_amount of (100 + 110 + 120 + 130 + 110 + 140 + 150)/7 = 122.86
-- 2nd moving average from 2019-01-02 to 2019-01-08 has an average_amount of (110 + 120 + 130 + 110 + 140 + 150 + 80)/7 = 120
-- 3rd moving average from 2019-01-03 to 2019-01-09 has an average_amount of (120 + 130 + 110 + 140 + 150 + 80 + 110)/7 = 120
-- 4th moving average from 2019-01-04 to 2019-01-10 has an average_amount of (130 + 110 + 140 + 150 + 80 + 110 + 130 + 150)/7 = 142.86

-- ======= Solution
================================================================================

select visited_on, sum(amount) over(order by visited_on rows 6 preceding),
round(avg(amount) over(order by visited_on rows 6 preceding),2)
from
(
        select visited_on, sum(amount) as amount
        from customer
        group by visited_on
        order by visited_on
) a
order by visited_on offset 6 rows

 -- ######################################################################
 -- Question 76
-- Table: Scores

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | player_name   | varchar |
-- | gender        | varchar |
-- | day           | date    |
-- | score_points  | int     |
-- +---------------+---------+
-- (gender, day) is the primary key for this table.
-- A competition is held between females team and males team.
-- Each row of this table indicates that a player_name and with gender has scored score_point in someday.
-- Gender is 'F' if the player is in females team and 'M' if the player is in males team.
```

-- Write an SQL query to find the total score for each gender at each day.

-- Order the result table by gender and day

-- The query result format is in the following example:

-- Scores table:
-- +-------------+--------+------------+--------------+
-- | player_name | gender | day        | score_points |
-- +-------------+--------+------------+--------------+
-- | Aron        | F      | 2020-01-01 | 17           |
-- | Alice       | F      | 2020-01-07 | 23           |
-- | Bajrang     | M      | 2020-01-07 | 7            |
-- | Khali       | M      | 2019-12-25 | 11           |
-- | Slaman      | M      | 2019-12-30 | 13           |
-- | Joe         | M      | 2019-12-31 | 3            |
-- | Jose        | M      | 2019-12-18 | 2            |
-- | Priya       | F      | 2019-12-31 | 23           |
-- | Priyanka    | F      | 2019-12-30 | 17           |
-- +-------------+--------+------------+--------------+
-- Result table:
-- +--------+------------+-------+
-- | gender | day        | total |
-- +--------+------------+-------+
-- | F      | 2019-12-30 | 17    |
-- | F      | 2019-12-31 | 40    |
-- | F      | 2020-01-01 | 57    |
-- | F      | 2020-01-07 | 80    |
-- | M      | 2019-12-18 | 2     |
-- | M      | 2019-12-25 | 13    |
-- | M      | 2019-12-30 | 26    |
-- | M      | 2019-12-31 | 29    |
-- | M      | 2020-01-07 | 36    |
-- +--------+------------+-------+
-- For females team:
-- First day is 2019-12-30, Priyanka scored 17 points and the total score for the team is 17.
-- Second day is 2019-12-31, Priya scored 23 points and the total score for the team is 40.
-- Third day is 2020-01-01, Aron scored 17 points and the total score for the team is 57.
-- Fourth day is 2020-01-07, Alice scored 23 points and the total score for the team is 80.
-- For males team:
-- First day is 2019-12-18, Jose scored 2 points and the total score for the team is 2.
-- Second day is 2019-12-25, Khali scored 11 points and the total score for the team is 13.
-- Third day is 2019-12-30, Slaman scored 13 points and the total score for the team is 26.
-- Fourth day is 2019-12-31, Joe scored 3 points and the total score for the team is 29.
-- Fifth day is 2020-01-07, Bajrang scored 7 points and the total score for the team is 36.

-- ======= Solution
==========

select gender, day,

```
sum(score_points) over(partition by gender order by day) as total
from scores
group by 1,2
order by 1,2

 -- ######################################################################
 -- Question 70
-- In facebook, there is a follow table with two columns: followee, follower.

-- Please write a sql query to get the amount of each follower’s follower if he/she has one.

-- For example:

-- +-------------+------------+
-- | followee    | follower   |
-- +-------------+------------+
-- |    A        |    B       |
-- |    B        |    C       |
-- |    B        |    D       |
-- |    D        |    E       |
-- +-------------+------------+
-- should output:
-- +-------------+------------+
-- | follower    | num        |
-- +-------------+------------+
-- |    B        |  2         |
-- |    D        |  1         |
-- +-------------+------------+
-- Explaination:
-- Both B and D exist in the follower list, when as a followee, B's follower is C and D, and D's follower is E. A does not exist in follower list.


-- Note:
-- Followee would not follow himself/herself in all cases.
-- Please display the result in follower's alphabet order.

-- ======= Solution
================================================================================

select followee as follower, count(distinct(follower)) as num
from follow
where followee = any(select follower from follow)
group by followee
order by followee

 -- ######################################################################
 -- Question 89
-- Table point_2d holds the coordinates (x,y) of some unique points (more than two) in a plane.
```

-- Write a query to find the shortest distance between these points rounded to 2 decimals.

-- | x  | y  |
-- |----|----|
-- | -1 | -1 |
-- | 0  | 0  |
-- | -1 | -2 |

-- The shortest distance is 1.00 from point (-1,-1) to (-1,2). So the output should be:

-- | shortest |
-- |----------|
-- | 1.00     |

-- Note: The longest distance among all the points are less than 10000.

-- ======= Solution
```
================================================================================
```

```
select round(a.shortest,2) as shortest
from(
select sqrt(pow((p1.x-p2.x),2)+pow((p1.y-p2.y),2)) as shortest
from point_2d p1
cross join point_2d p2
where p1.x!=p2.x or p1.y!=p2.y
order by sqrt(pow((p1.x-p2.x),2)+pow((p1.y-p2.y),2))
limit 1) a
```

-- ########################################################################
-- Question 65
-- Table: Events

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | business_id   | int     |
-- | event_type    | varchar |
-- | occurences    | int     |
-- +---------------+---------+
-- (business_id, event_type) is the primary key of t

-- ########################################################################
-- Question 53
-- Table: Teams

-- +---------------+----------+
-- | Column Name   | Type     |

-- +---------------+----------+
-- | team_id       | int      |
-- | team_name     | varchar  |
-- +---------------+----------+
-- team_id is the primary key of this table.
-- Each row of this table represents a single football team.
-- Table: Matches

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | match_id      | int     |
-- | host_team     | int     |
-- | guest_team    | int     |
-- | host_goals    | int     |
-- | guest_goals   | int     |
-- +---------------+---------+
-- match_id is the primary key of this table.
-- Each row is a record of a finished match between two different teams.
-- Teams host_team and guest_team are represented by their IDs in the teams table (team_id) and they scored host_goals and guest_goals goals respectively.

-- You would like to compute the scores of all teams after all matches. Points are awarded as follows:
-- A team receives three points if they win a match (Score strictly more goals than the opponent team).
-- A team receives one point if they draw a match (Same number of goals as the opponent team).
-- A team receives no points if they lose a match (Score less goals than the opponent team).
-- Write an SQL query that selects the team_id, team_name and num_points of each team in the tournament after all described matches. Result table should be ordered by num_points (decreasing order). In case of a tie, order the records by team_id (increasing order).

-- The query result format is in the following example:

-- Teams table:
-- +-----------+--------------+
-- | team_id   | team_name    |
-- +-----------+--------------+
-- | 10        | Leetcode FC  |
-- | 20        | NewYork FC   |
-- | 30        | Atlanta FC   |
-- | 40        | Chicago FC   |
-- | 50        | Toronto FC   |
-- +-----------+--------------+

-- Matches table:
-- +------------+--------------+---------------+-------------+--------------+
-- | match_id   | host_team    | guest_team    | host_goals  | guest_goals  |
-- +------------+--------------+---------------+-------------+--------------+
-- | 1          | 10           | 20            | 3           | 0            |
-- | 2          | 30           | 10            | 2           | 2            |
-- | 3          | 10           | 50            | 5           | 1            |

```
-- | 4         | 20          | 30          | 1         | 0         |
-- | 5         | 50          | 30          | 1         | 0         |
-- +-----------+-------------+-------------+-----------+-----------+

-- Result table:
-- +-----------+-------------+--------------+
-- | team_id   | team_name   | num_points   |
-- +-----------+-------------+--------------+
-- | 10        | Leetcode FC | 7            |
-- | 20        | NewYork FC  | 3            |
-- | 50        | Toronto FC  | 3            |
-- | 30        | Atlanta FC  | 1            |
-- | 40        | Chicago FC  | 0            |
-- +-----------+-------------+--------------+

-- ======= Solution
================================================================================

with t1 as(
Select c.host_id, c.host_name, c.host_points
from(
select a.match_id, a.team_id as host_id, a.team_name as host_name, b.team_id as guest_id, b.team_name as
guest_name, a.host_goals, a.guest_goals,
case
when a.host_goals > a.guest_goals then 3
when a.host_goals = a.guest_goals then 1
else 0
end as host_points,
case
when a.host_goals < a.guest_goals then 3
when a.host_goals = a.guest_goals then 1
else 0
end as guest_points
from(
select *
from matches m
join teams t
on t.team_id = m.host_team) a
join
(select *
from matches m
join teams t
on t.team_id = m.guest_team) b
on a.match_id = b.match_id) c
union all
Select d.guest_id, d.guest_name, d.guest_points
from(
select a.match_id, a.team_id as host_id, a.team_name as host_name, b.team_id as guest_id, b.team_name as
guest_name, a.host_goals, a.guest_goals,
case
when a.host_goals > a.guest_goals then 3
```

```
when a.host_goals = a.guest_goals then 1
else 0
end as host_points,
case
when a.host_goals < a.guest_goals then 3
when a.host_goals = a.guest_goals then 1
else 0
end as guest_points
from(
select *
from matches m
join teams t
on t.team_id = m.host_team) a
join
(select *
from matches m
join teams t
on t.team_id = m.guest_team) b
on a.match_id = b.match_id) d)

Select team_id, team_name, coalesce(total,0) as num_points
from teams t2
left join(
select host_id, host_name, sum(host_points) as total
from t1
group by host_id, host_name) e
on t2.team_id = e.host_id
order by num_points desc, team_id


 -- ######################################################################
 -- Question 58
-- Given a table tree, id is identifier of the tree node and p_id is its parent node's id.

-- +----+------+
-- | id | p_id |
-- +----+------+
-- | 1  | null |
-- | 2  | 1    |
-- | 3  | 1    |
-- | 4  | 2    |
-- | 5  | 2    |
-- +----+------+
-- Each node in the tree can be one of three types:
-- Leaf: if the node is a leaf node.
-- Root: if the node is the root of the tree.
-- Inner: If the node is neither a leaf node nor a root node.


-- Write a query to print the node id and the type of the node. Sort your output by the node id. The result for the above sample is:
```

```
-- +----+------+
-- | id | Type |
-- +----+------+
-- | 1  | Root |
-- | 2  | Inner|
-- | 3  | Leaf |
-- | 4  | Leaf |
-- | 5  | Leaf |
-- +----+------+


-- Explanation



-- Node '1' is root node, because its parent node is NULL and it has child node '2' and '3'.
-- Node '2' is inner node, because it has parent node '1' and child node '4' and '5'.
-- Node '3', '4' and '5' is Leaf node, because they have parent node and they don't have child node.

-- And here is the image of the sample tree as below:


--                          1
--                         /  \
--        2     3
--       /  \
--     4     5
-- Note

-- If there is only one node on the tree, you only need to output its root attributes.

-- ======= Solution
================================================================================

select id,
case when p_id is null then 'Root'
when id not in (select p_id from tree where p_id is not null group by p_id) then 'Leaf'
else 'Inner'
end as Type
from tree
order by id

 -- ######################################################################
 -- Question 64
-- Table: Books

-- +----------------+---------+
-- | Column Name    | Type    |
-- +----------------+---------+
```

-- | book_id | int |
-- | name | varchar |
-- | available_from | date |
-- +----------------+---------+
-- book_id is the primary key of this table.
-- Table: Orders

-- +----------------+---------+
-- | Column Name | Type |
-- +----------------+---------+
-- | order_id | int |
-- | book_id | int |
-- | quantity | int |
-- | dispatch_date | date |
-- +----------------+---------+
-- order_id is the primary key of this table.
-- book_id is a foreign key to the Books table.

-- Write an SQL query that reports the books that have sold less than 10 copies in the last year, excluding books that have been available for less than 1 month from today. Assume today is 2019-06-23.

-- The query result format is in the following example:

-- Books table:
-- +---------+--------------------+----------------+
-- | book_id | name | available_from |
-- +---------+--------------------+----------------+
-- | 1 | "Kalila And Demna" | 2010-01-01 |
-- | 2 | "28 Letters" | 2012-05-12 |
-- | 3 | "The Hobbit" | 2019-06-10 |
-- | 4 | "13 Reasons Why" | 2019-06-01 |
-- | 5 | "The Hunger Games" | 2008-09-21 |
-- +---------+--------------------+----------------+

-- Orders table:
-- +----------+---------+----------+---------------+
-- | order_id | book_id | quantity | dispatch_date |
-- +----------+---------+----------+---------------+
-- | 1 | 1 | 2 | 2018-07-26 |
-- | 2 | 1 | 1 | 2018-11-05 |
-- | 3 | 3 | 8 | 2019-06-11 |
-- | 4 | 4 | 6 | 2019-06-05 |
-- | 5 | 4 | 5 | 2019-06-20 |
-- | 6 | 5 | 9 | 2009-02-02 |
-- | 7 | 5 | 8 | 2010-04-13 |
-- +----------+---------+----------+---------------+

-- Result table:
-- +-----------+--------------------+
-- | book_id | name |

```
-- +-----------+--------------------+
-- | 1         | "Kalila And Demna" |
-- | 2         | "28 Letters"       |
-- | 5         | "The Hunger Games" |
-- +-----------+--------------------+

-- ======= Solution
================================================================================

select b.book_id, name
from
(select *
from books
where available_from < '2019-05-23') b
left join
(select *
from orders
where dispatch_date > '2018-06-23') a
on a.book_id = b.book_id
group by b.book_id, name
having coalesce(sum(quantity),0)<10

 -- ##########################################################################
 -- Question 88
-- Table: Candidate

-- +-----+----------+
-- | id  | Name     |
-- +-----+----------+
-- | 1   | A        |
-- | 2   | B        |
-- | 3   | C        |
-- | 4   | D        |
-- | 5   | E        |
-- +-----+----------+
-- Table: Vote

-- +-----+--------------+
-- | id  | CandidateId  |
-- +-----+--------------+
-- | 1   |     2        |
-- | 2   |     4        |
-- | 3   |     3        |
-- | 4   |     2        |
-- | 5   |     5        |
-- +-----+--------------+
-- id is the auto-increment primary key,
-- CandidateId is the id appeared in Candidate table.
-- Write a sql to find the name of the winning candidate, the above example will return the winner B.

-- +------+
```

-- | Name |
-- +------+
-- | B    |
-- +------+
-- Notes:

-- You may assume there is no tie, in other words there will be only one winning candidate

-- ======= Solution
================================================================================

```
with t1 as (
select *, rank() over(order by b.votes desc) as rk
from candidate c
join
(select candidateid, count(*) as votes
from vote
group by candidateid) b
on c.id = b.candidateid)

select t1.name
from t1
where t1.rk=1
```

-- ######################################################################
-- Question 108
-- Given two tables as below, write a query to display the comparison result (higher/lower/same) of the
-- average salary of employees in a department to the company's average salary.

-- Table: salary
-- | id | employee_id | amount | pay_date   |
-- |----|-------------|--------|------------|
-- | 1  | 1           | 9000   | 2017-03-31 |
-- | 2  | 2           | 6000   | 2017-03-31 |
-- | 3  | 3           | 10000  | 2017-03-31 |
-- | 4  | 1           | 7000   | 2017-02-28 |
-- | 5  | 2           | 6000   | 2017-02-28 |
-- | 6  | 3           | 8000   | 2017-02-28 |

-- The employee_id column refers to the employee_id in the following table employee.

-- | employee_id | department_id |
-- |-------------|---------------|
-- | 1           | 1             |
-- | 2           | 2             |
-- | 3           | 2             |

-- So for the sample data above, the result is:

-- | pay_month | department_id | comparison  |
-- |-----------|---------------|-------------|
-- | 2017-03   | 1             | higher      |
-- | 2017-03   | 2             | lower       |
-- | 2017-02   | 1             | same        |
-- | 2017-02   | 2             | same        |

-- Explanation

-- In March, the company's average salary is (9000+6000+10000)/3 = 8333.33...

-- The average salary for department '1' is 9000, which is the salary of employee_id '1' since there is only one employee in this department. So the comparison result is 'higher' since 9000 > 8333.33 obviously.

-- The average salary of department '2' is (6000 + 10000)/2 = 8000, which is the average of employee_id '2' and '3'. So the comparison result is 'lower' since 8000 < 8333.33.

-- With he same formula for the average salary comparison in February, the result is 'same' since both the department '1' and '2' have the same average salary with the company, which is 7000.

-- ======= Solution
==========

```
with t1 as(
select date_format(pay_date,'%Y-%m') as pay_month, department_id, avg(amount) over(partition by
month(pay_date),department_id) as dept_avg,
avg(amount) over(partition by month(pay_date)) as comp_avg
from salary s join employee e
using (employee_id))

select distinct pay_month, department_id,
case when dept_avg>comp_avg then "higher"
when dept_avg = comp_avg then "same"
else "lower"
end as comparison
from t1
order by 1 desc
```

-- ######################################################################
-- Question 102
-- The Employee table holds the salary information in a year.

-- Write a SQL to get the cumulative sum of an employee's salary over a period of 3 months but exclude the most recent month.

-- The result should be displayed by 'Id' ascending, and then by 'Month' descending.

-- Example
-- Input

-- | Id | Month | Salary |
-- |----|-------|--------|
-- | 1  | 1     | 20     |
-- | 2  | 1     | 20     |
-- | 1  | 2     | 30     |
-- | 2  | 2     | 30     |
-- | 3  | 2     | 40     |
-- | 1  | 3     | 40     |
-- | 3  | 3     | 60     |
-- | 1  | 4     | 60     |
-- | 3  | 4     | 70     |
-- Output

-- | Id | Month | Salary |
-- |----|-------|--------|
-- | 1  | 3     | 90     |
-- | 1  | 2     | 50     |
-- | 1  | 1     | 20     |
-- | 2  | 1     | 20     |
-- | 3  | 3     | 100    |
-- | 3  | 2     | 40     |

-- Explanation
-- Employee '1' has 3 salary records for the following 3 months except the most recent month '4': salary 40 for month '3', 30 for month '2' and 20 for month '1'
-- So the cumulative sum of salary of this employee over 3 months is 90(40+30+20), 50(30+20) and 20 respectively.

-- | Id | Month | Salary |
-- |----|-------|--------|
-- | 1  | 3     | 90     |
-- | 1  | 2     | 50     |
-- | 1  | 1     | 20     |
-- Employee '2' only has one salary record (month '1') except its most recent month '2'.
-- | Id | Month | Salary |
-- |----|-------|--------|
-- | 2  | 1     | 20     |

-- Employ '3' has two salary records except its most recent pay month '4': month '3' with 60 and month '2' with 40. So the cumulative salary is as following.
-- | Id | Month | Salary |
-- |----|-------|--------|

-- | 3  | 3    | 100   |
-- | 3  | 2    | 40    |

-- ======= Solution
================================================================================

with t1 as(
select *, max(month) over(partition by id) as recent_month
from employee)

select id, month, sum(salary) over(partition by id order by month rows between 2 preceding and current row) as salary
from t1
where month<recent_month
order by 1, 2 desc

-- ######################################################################
-- Question 14
-- The Employee table holds all employees. Every employee has an Id, and there is also a column for the department Id.

-- +----+-------+--------+--------------+
-- | Id | Name  | Salary | DepartmentId |
-- +----+-------+--------+--------------+
-- | 1  | Joe   | 85000  | 1            |
-- | 2  | Henry | 80000  | 2            |
-- | 3  | Sam   | 60000  | 2            |
-- | 4  | Max   | 90000  | 1            |
-- | 5  | Janet | 69000  | 1            |
-- | 6  | Randy | 85000  | 1            |
-- | 7  | Will  | 70000  | 1            |
-- +----+-------+--------+--------------+
-- The Department table holds all departments of the company.

-- +----+----------+
-- | Id | Name     |
-- +----+----------+
-- | 1  | IT       |
-- | 2  | Sales    |
-- +----+----------+
-- Write a SQL query to find employees who earn the top three salaries in each of the department. For the above tables, your SQL query should return the following rows (order of rows does not matter).

-- +------------+----------+--------+
-- | Department | Employee | Salary |
-- +------------+----------+--------+
-- | IT         | Max      | 90000  |
-- | IT         | Randy    | 85000  |
-- | IT         | Joe      | 85000  |
-- | IT         | Will     | 70000  |
-- | Sales      | Henry    | 80000  |

```
-- | Sales      | Sam      | 60000  |
-- +------------+----------+--------+
-- Explanation:

-- In IT department, Max earns the highest salary, both Randy and Joe earn the second highest salary,
-- and Will earns the third highest salary.
-- There are only two employees in the Sales department,
-- Henry earns the highest salary while Sam earns the second highest salary.

-- ======= Solution
================================================================================

select a.department, a.employee, a.salary
from (
select d.name as department, e.name as employee, salary,
   dense_rank() over(Partition by d.name order by salary desc) as rk
from Employee e join Department d
on e.departmentid = d.id) a
where a.rk<4

 -- ########################################################################
 -- Question 107
-- The Numbers table keeps the value of number and its frequency.

-- +----------+-------------+
-- |  Number  |  Frequency  |
-- +----------+-------------|
-- |  0       |  7          |
-- |  1       |  1          |
-- |  2       |  3          |
-- |  3       |  1          |
-- +----------+-------------+
-- In this table, the numbers are 0, 0, 0, 0, 0, 0, 0, 1, 2, 2, 2, 3, so the median is (0 + 0) / 2 = 0.

-- +--------+
-- | median |
-- +--------|
-- | 0.0000 |
-- +--------+
-- Write a query to find the median of all numbers and name the result as median.

-- ======= Solution
================================================================================

with t1 as(
select *,
sum(frequency) over(order by number) as cum_sum, (sum(frequency) over())/2 as middle
from numbers)

select avg(number) as median
from t1
```

where middle between (cum_sum - frequency) and cum_sum

```
 -- ##########################################################################
 -- Question 106
-- Table: Student

-- +---------------------+---------+
-- | Column Name         | Type    |
-- +---------------------+---------+
-- | student_id          | int     |
-- | student_name        | varchar |
-- +---------------------+---------+
-- student_id is the primary key for this table.
-- student_name is the name of the student.


-- Table: Exam

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | exam_id       | int     |
-- | student_id    | int     |
-- | score         | int     |
-- +---------------+---------+
-- (exam_id, student_id) is the primary key for this table.
-- Student with student_id got score points in exam with id exam_id.


-- A "quite" student is the one who took at least one exam and didn't score neither the high score nor the low score.

-- Write an SQL query to report the students (student_id, student_name) being "quiet" in ALL exams.

-- Don't return the student who has never taken any exam. Return the result table ordered by student_id.

-- The query result format is in the following example.



-- Student table:
-- +-------------+---------------+
-- | student_id  | student_name  |
-- +-------------+---------------+
-- | 1           | Daniel        |
-- | 2           | Jade          |
-- | 3           | Stella        |
-- | 4           | Jonathan      |
-- | 5           | Will          |
-- +-------------+---------------+
```

```
-- Exam table:
-- +------------+--------------+-----------+
-- | exam_id    | student_id   | score     |
-- +------------+--------------+-----------+
-- | 10         |    1         |   70      |
-- | 10         |    2         |   80      |
-- | 10         |    3         |   90      |
-- | 20         |    1         |   80      |
-- | 30         |    1         |   70      |
-- | 30         |    3         |   80      |
-- | 30         |    4         |   90      |
-- | 40         |    1         |   60      |
-- | 40         |    2         |   70      |
-- | 40         |    4         |   80      |
-- +------------+--------------+-----------+

-- Result table:
-- +-------------+---------------+
-- | student_id  | student_name  |
-- +-------------+---------------+
-- | 2           | Jade          |
-- +-------------+---------------+

-- For exam 1: Student 1 and 3 hold the lowest and high score respectively.
-- For exam 2: Student 1 hold both highest and lowest score.
-- For exam 3 and 4: Studnet 1 and 4 hold the lowest and high score respectively.
-- Student 2 and 5 have never got the highest or lowest in any of the exam.
-- Since student 5 is not taking any exam, he is excluded from the result.
-- So, we only return the information of Student 2.

-- ======= Solution
================================================================================

with t1 as(
select student_id
from
(select *,
min(score) over(partition by exam_id) as least,
max(score) over(partition by exam_id) as most
from exam) a
where least = score or most = score)


select distinct student_id, student_name
from exam join student
using (student_id)
where student_id != all(select student_id from t1)
order by 1

 -- ######################################################################
 -- Question 111
```

-- Table: Activity

-- +--------------+---------+
-- | Column Name  | Type    |
-- +--------------+---------+
-- | player_id    | int     |
-- | device_id    | int     |
-- | event_date   | date    |
-- | games_played | int     |
-- +--------------+---------+
-- (player_id, event_date) is the primary key of this table.
-- This table shows the activity of players of some game.
-- Each row is a record of a player who logged in and played a number of games (possibly 0) before logging out on some day using some device.

-- We define the install date of a player to be the first login day of that player.

-- We also define day 1 retention of some date X to be the number of players whose install date is X and they logged back in on the day right after X, divided by the number of players whose install date is X, rounded to 2 decimal places.

-- Write an SQL query that reports for each install date, the number of players that installed the game on that day and the day 1 retention.

-- The query result format is in the following example:

-- Activity table:
-- +-----------+-----------+------------+--------------+
-- | player_id | device_id | event_date | games_played |
-- +-----------+-----------+------------+--------------+
-- | 1         | 2         | 2016-03-01 | 5            |
-- | 1         | 2         | 2016-03-02 | 6            |
-- | 2         | 3         | 2017-06-25 | 1            |
-- | 3         | 1         | 2016-03-01 | 0            |
-- | 3         | 4         | 2016-07-03 | 5            |
-- +-----------+-----------+------------+--------------+

-- Result table:
-- +------------+----------+----------------+
-- | install_dt | installs | Day1_retention |
-- +------------+----------+----------------+
-- | 2016-03-01 | 2        | 0.50           |
-- | 2017-06-25 | 1        | 0.00           |
-- +------------+----------+----------------+
-- Player 1 and 3 installed the game on 2016-03-01 but only player 1 logged back in on 2016-03-02 so the
-- day 1 retention of 2016-03-01 is 1 / 2 = 0.50
-- Player 2 installed the game on 2017-06-25 but didn't log back in on 2017-06-26 so the day 1 retention of 2017-06-25 is 0 / 1 = 0.00

-- ======= Solution
==========

```
with t1 as(
select *,
row_number() over(partition by player_id order by event_date) as rnk,
min(event_date) over(partition by player_id) as install_dt,
lead(event_date,1) over(partition by player_id order by event_date) as nxt
from Activity)

select distinct install_dt,
count(distinct player_id) as installs,
round(sum(case when nxt=event_date+1 then 1 else 0 end)/count(distinct player_id),2) as Day1_retention
from t1
where rnk = 1
group by 1
order by 1
```

```
 -- ######################################################################
 -- Question 99
-- X city built a new stadium, each day many people visit it and the stats are saved as these columns: id, visit_date, people

-- Please write a query to display the records which have 3 or more consecutive rows and the amount of people more than 100(inclusive).

-- For example, the table stadium:
-- +------+------------+-----------+
-- | id   | visit_date | people    |
-- +------+------------+-----------+
-- | 1    | 2017-01-01 | 10        |
-- | 2    | 2017-01-02 | 109       |
-- | 3    | 2017-01-03 | 150       |
-- | 4    | 2017-01-04 | 99        |
-- | 5    | 2017-01-05 | 145       |
-- | 6    | 2017-01-06 | 1455      |
-- | 7    | 2017-01-07 | 199       |
-- | 8    | 2017-01-08 | 188       |
-- +------+------------+-----------+
-- For the sample data above, the output is:

-- +------+------------+-----------+
-- | id   | visit_date | people    |
-- +------+------------+-----------+
-- | 5    | 2017-01-05 | 145       |
-- | 6    | 2017-01-06 | 1455      |
-- | 7    | 2017-01-07 | 199       |
-- | 8    | 2017-01-08 | 188       |
-- +------+------------+-----------+
-- Note:
-- Each day only have one row record, and the dates are increasing with id increasing.
```

```
-- ======= Solution
================================================================================

WITH t1 AS (
        SELECT id,
            visit_date,
            people,
            id - ROW_NUMBER() OVER(ORDER BY visit_date) AS dates
          FROM stadium
        WHERE people >= 100)

SELECT t1.id,
    t1.visit_date,
    t1people
FROM t1
LEFT JOIN (
        SELECT dates,
            COUNT(*) as total
          FROM t1
        GROUP BY dates) AS b
USING (dates)
WHERE b.total > 2


 -- ######################################################################
 -- Question 103
-- Table: Users

-- +----------------+---------+
-- | Column Name    | Type    |
-- +----------------+---------+
-- | user_id        | int     |
-- | join_date      | date    |
-- | favorite_brand | varchar |
-- +----------------+---------+
-- user_id is the primary key of this table.
-- This table has the info of the users of an online shopping website where users can sell and buy items.
-- Table: Orders

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | order_id      | int     |
-- | order_date    | date    |
-- | item_id       | int     |
-- | buyer_id      | int     |
-- | seller_id     | int     |
-- +---------------+---------+
-- order_id is the primary key of this table.
-- item_id is a foreign key to the Items table.
-- buyer_id and seller_id are foreign keys to the Users table.
```

-- Table: Items

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | item_id       | int     |
-- | item_brand    | varchar |
-- +---------------+---------+
-- item_id is the primary key of this table.


-- Write an SQL query to find for each user, whether the brand of the second item (by date) they sold is their favorite brand. If a user sold less than two items, report the answer for that user as no.

-- It is guaranteed that no seller sold more than one item on a day.

-- The query result format is in the following example:

-- Users table:
-- +---------+------------+----------------+
-- | user_id | join_date  | favorite_brand |
-- +---------+------------+----------------+
-- | 1       | 2019-01-01 | Lenovo         |
-- | 2       | 2019-02-09 | Samsung        |
-- | 3       | 2019-01-19 | LG             |
-- | 4       | 2019-05-21 | HP             |
-- +---------+------------+----------------+

-- Orders table:
-- +----------+------------+---------+----------+-----------+
-- | order_id | order_date | item_id | buyer_id | seller_id |
-- +----------+------------+---------+----------+-----------+
-- | 1        | 2019-08-01 | 4       | 1        | 2         |
-- | 2        | 2019-08-02 | 2       | 1        | 3         |
-- | 3        | 2019-08-03 | 3       | 2        | 3         |
-- | 4        | 2019-08-04 | 1       | 4        | 2         |
-- | 5        | 2019-08-04 | 1       | 3        | 4         |
-- | 6        | 2019-08-05 | 2       | 2        | 4         |
-- +----------+------------+---------+----------+-----------+

-- Items table:
-- +---------+------------+
-- | item_id | item_brand |
-- +---------+------------+
-- | 1       | Samsung    |
-- | 2       | Lenovo     |
-- | 3       | LG         |
-- | 4       | HP         |
-- +---------+------------+

-- Result table:

```
-- +-----------+--------------------+
-- | seller_id | 2nd_item_fav_brand |
-- +-----------+--------------------+
-- | 1         | no                 |
-- | 2         | yes                |
-- | 3         | yes                |
-- | 4         | no                 |
-- +-----------+--------------------+

-- The answer for the user with id 1 is no because they sold nothing.
-- The answer for the users with id 2 and 3 is yes because the brands of their second sold items are their favorite brands.
-- The answer for the user with id 4 is no because the brand of their second sold item is not their favorite brand.

-- ======= Solution
================================================================================

with t1 as(
select user_id,
case when favorite_brand = item_brand then "yes"
else "no"
end as 2nd_item_fav_brand
from users u left join
(select o.item_id, seller_id, item_brand, rank() over(partition by seller_id order by order_date) as rk
from orders o join items i
using (item_id)) a
on u.user_id = a.seller_id
where a.rk = 2)

select u.user_id as seller_id, coalesce(2nd_item_fav_brand,"no") as 2nd_item_fav_brand
from users u left join t1
using(user_id)

 -- ######################################################################
 -- Question 105
-- The Employee table holds all employees. The employee table has three columns: Employee Id, Company Name, and Salary.

-- +-----+------------+--------+
-- |Id   | Company    | Salary |
-- +-----+------------+--------+
-- |1    | A          | 2341   |
-- |2    | A          | 341    |
-- |3    | A          | 15     |
-- |4    | A          | 15314  |
-- |5    | A          | 451    |
-- |6    | A          | 513    |
-- |7    | B          | 15     |
-- |8    | B          | 13     |
-- |9    | B          | 1154   |
-- |10   | B          | 1345   |
-- |11   | B          | 1221   |
```

-- |12  | B       | 234   |
-- |13  | C       | 2345  |
-- |14  | C       | 2645  |
-- |15  | C       | 2645  |
-- |16  | C       | 2652  |
-- |17  | C       | 65    |
-- +-----+------------+--------+
-- Write a SQL query to find the median salary of each company. Bonus points if you can solve it without using any built-in SQL functions.

-- +-----+------------+--------+
-- |Id  | Company   | Salary |
-- +-----+------------+--------+
-- |5   | A       | 451   |
-- |6   | A       | 513   |
-- |12  | B       | 234   |
-- |9   | B       | 1154  |
-- |14  | C       | 2645  |
-- +-----+------------+--------+

-- ======= Solution
==========

```
select id, company, salary
from
(select *,
row_number() over(partition by company order by salary) as rn,
count(*) over(partition by company) as cnt
from employee) a
where rn between cnt/2 and cnt/2+1--Question 101
```

-- Table: Visits

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | user_id       | int     |
-- | visit_date    | date    |
-- +---------------+---------+
-- (user_id, visit_date) is the primary key for this table.
-- Each row of this table indicates that user_id has visited the bank in visit_date.

-- Table: Transactions

-- +------------------+---------+
-- | Column Name      | Type    |
-- +------------------+---------+
-- | user_id          | int     |
-- | transaction_date | date    |
-- | amount           | int     |
-- +------------------+---------+

-- There is no primary key for this table, it may contain duplicates.
-- Each row of this table indicates that user_id has done a transaction of amount in transaction_date.
-- It is guaranteed that the user has visited the bank in the transaction_date.(i.e The Visits table contains (user_id, transaction_date) in one row)

-- A bank wants to draw a chart of the number of transactions bank visitors did in one visit to the bank and the corresponding number of visitors who have done this number of transaction in one visit.

-- Write an SQL query to find how many users visited the bank and didn't do any transactions, how many visited the bank and did one transaction and so on.

-- The result table will contain two columns:

-- transactions_count which is the number of transactions done in one visit.
-- visits_count which is the corresponding number of users who did transactions_count in one visit to the bank.
-- transactions_count should take all values from 0 to max(transactions_count) done by one or more users.

-- Order the result table by transactions_count.

-- The query result format is in the following example:

-- Visits table:
-- +---------+------------+
-- | user_id | visit_date |
-- +---------+------------+
-- | 1       | 2020-01-01 |
-- | 2       | 2020-01-02 |
-- | 12      | 2020-01-01 |
-- | 19      | 2020-01-03 |
-- | 1       | 2020-01-02 |
-- | 2       | 2020-01-03 |
-- | 1       | 2020-01-04 |
-- | 7       | 2020-01-11 |
-- | 9       | 2020-01-25 |
-- | 8       | 2020-01-28 |
-- +---------+------------+
-- Transactions table:
-- +---------+------------------+--------+
-- | user_id | transaction_date | amount |
-- +---------+------------------+--------+
-- | 1       | 2020-01-02       | 120    |
-- | 2       | 2020-01-03       | 22     |
-- | 7       | 2020-01-11       | 232    |
-- | 1       | 2020-01-04       | 7      |
-- | 9       | 2020-01-25       | 33     |
-- | 9       | 2020-01-25       | 66     |
-- | 8       | 2020-01-28       | 1      |
-- | 9       | 2020-01-25       | 99     |
-- +---------+------------------+--------+
-- Result table:

```
-- +--------------------+--------------+
-- | transactions_count | visits_count |
-- +--------------------+--------------+
-- | 0                  | 4            |
-- | 1                  | 5            |
-- | 2                  | 0            |
-- | 3                  | 1            |
-- +--------------------+--------------+
-- * For transactions_count = 0, The visits (1, "2020-01-01"), (2, "2020-01-02"), (12, "2020-01-01") and (19, "2020-01-03") did no transactions so visits_count = 4.
-- * For transactions_count = 1, The visits (2, "2020-01-03"), (7, "2020-01-11"), (8, "2020-01-28"), (1, "2020-01-02") and (1, "2020-01-04") did one transaction so visits_count = 5.
-- * For transactions_count = 2, No customers visited the bank and did two transactions so visits_count = 0.
-- * For transactions_count = 3, The visit (9, "2020-01-25") did three transactions so visits_count = 1.
-- * For transactions_count >= 4, No customers visited the bank and did more than three transactions so we will stop at transactions_count = 3

-- ======= Solution
================================================================================

WITH RECURSIVE t1 AS(
            SELECT visit_date,
                 COALESCE(num_visits,0) as num_visits,
                 COALESCE(num_trans,0) as num_trans
            FROM ((
                SELECT visit_date, user_id, COUNT(*) as num_visits
                FROM visits
                GROUP BY 1, 2) AS a
               LEFT JOIN
                (
                 SELECT transaction_date,
                      user_id,
                      count(*) as num_trans
                  FROM transactions
                 GROUP BY 1, 2) AS b
                ON a.visit_date = b.transaction_date and a.user_id = b.user_id)
              ),

        t2 AS (
             SELECT MAX(num_trans) as trans
               FROM t1
             UNION ALL
             SELECT trans-1
               FROM t2
             WHERE trans >= 1)

SELECT trans as transactions_count,
    COALESCE(visits_count,0) as visits_count
 FROM t2 LEFT JOIN (
            SELECT num_trans as transactions_count, COALESCE(COUNT(*),0) as visits_count
            FROM t1
```

```
            GROUP BY 1
            ORDER BY 1) AS a
ON a.transactions_count = t2.trans
ORDER BY 1
```

```
 -- ######################################################################
 -- Question 104
-- Table: Failed

-- +--------------+---------+
-- | Column Name  | Type    |
-- +--------------+---------+
-- | fail_date    | date    |
-- +--------------+---------+
-- Primary key for this table is fail_date.
-- Failed table contains the days of failed tasks.
-- Table: Succeeded

-- +--------------+---------+
-- | Column Name  | Type    |
-- +--------------+---------+
-- | success_date | date    |
-- +--------------+---------+
-- Primary key for this table is success_date.
-- Succeeded table contains the days of succeeded tasks.


-- A system is running one task every day. Every task is independent of the previous tasks. The tasks can fail or succeed.

-- Write an SQL query to generate a report of period_state for each continuous interval of days in the period from 2019-01-01 to 2019-12-31.

-- period_state is 'failed' if tasks in this interval failed or 'succeeded' if tasks in this interval succeeded. Interval of days are retrieved as start_date and end_date.

-- Order result by start_date.

-- The query result format is in the following example:

-- Failed table:
-- +-------------------+
-- | fail_date         |
-- +-------------------+
-- | 2018-12-28        |
-- | 2018-12-29        |
-- | 2019-01-04        |
-- | 2019-01-05        |
-- +-------------------+

-- Succeeded table:
```

```
-- +------------------+
-- | success_date     |
-- +------------------+
-- | 2018-12-30       |
-- | 2018-12-31       |
-- | 2019-01-01       |
-- | 2019-01-02       |
-- | 2019-01-03       |
-- | 2019-01-06       |
-- +------------------+


-- Result table:
-- +--------------+--------------+--------------+
-- | period_state | start_date   | end_date     |
-- +--------------+--------------+--------------+
-- | succeeded    | 2019-01-01   | 2019-01-03   |
-- | failed       | 2019-01-04   | 2019-01-05   |
-- | succeeded    | 2019-01-06   | 2019-01-06   |
-- +--------------+--------------+--------------+

-- The report ignored the system state in 2018 as we care about the system in the period 2019-01-01 to 2019-12-31.
-- From 2019-01-01 to 2019-01-03 all tasks succeeded and the system state was "succeeded".
-- From 2019-01-04 to 2019-01-05 all tasks failed and system state was "failed".
-- From 2019-01-06 to 2019-01-06 all tasks succeeded and system state was "succeeded".

-- ======= Solution
================================================================================

with t1 as(
select min(success_date) as start_date, max(success_date) as end_date, state
from(
select *, date_sub(success_date, interval row_number() over(order by success_date) day) as diff, 1 as state
from succeeded
where success_date between "2019-01-01" and "2019-12-31") a
group by diff),

t2 as(
select min(fail_date) as start_date, max(fail_date) as end_date, state
from(
select *, date_sub(fail_date, interval row_number() over(order by fail_date) day) as diff, 0 as state
from failed
where fail_date between "2019-01-01" and "2019-12-31") b
group by diff)


select
case when c.state = 1 then "succeeded"
else "failed"
end as period_state,start_date, end_date
from(
```

```
select *
from t1
union all
select *
from t2) c
order by start_date

 -- ##########################################################################
 -- Question 112
-- Table: Orders

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | order_id      | int     |
-- | customer_id   | int     |
-- | order_date    | date    |
-- | item_id       | varchar |
-- | quantity      | int     |
-- +---------------+---------+
-- (ordered_id, item_id) is the primary key for this table.
-- This table contains information of the orders placed.
-- order_date is the date when item_id was ordered by the customer with id customer_id.


-- Table: Items

-- +---------------------+---------+
-- | Column Name         | Type    |
-- +---------------------+---------+
-- | item_id             | varchar |
-- | item_name           | varchar |
-- | item_category       | varchar |
-- +---------------------+---------+
-- item_id is the primary key for this table.
-- item_name is the name of the item.
-- item_category is the category of the item.


-- You are the business owner and would like to obtain a sales report for category items and day of the week.

-- Write an SQL query to report how many units in each category have been ordered on each day of the week.

-- Return the result table ordered by category.

-- The query result format is in the following example:



-- Orders table:
-- +------------+--------------+-------------+--------------+-------------+
```

```
-- | order_id   | customer_id  | order_date  | item_id     | quantity    |
-- +------------+--------------+-------------+-------------+-------------+
-- | 1          | 1            | 2020-06-01  | 1           | 10          |
-- | 2          | 1            | 2020-06-08  | 2           | 10          |
-- | 3          | 2            | 2020-06-02  | 1           | 5           |
-- | 4          | 3            | 2020-06-03  | 3           | 5           |
-- | 5          | 4            | 2020-06-04  | 4           | 1           |
-- | 6          | 4            | 2020-06-05  | 5           | 5           |
-- | 7          | 5            | 2020-06-05  | 1           | 10          |
-- | 8          | 5            | 2020-06-14  | 4           | 5           |
-- | 9          | 5            | 2020-06-21  | 3           | 5           |
-- +------------+--------------+-------------+-------------+-------------+

-- Items table:
-- +------------+----------------+---------------+
-- | item_id    | item_name      | item_category |
-- +------------+----------------+---------------+
-- | 1          | LC Alg. Book   | Book          |
-- | 2          | LC DB. Book    | Book          |
-- | 3          | LC SmarthPhone | Phone         |
-- | 4          | LC Phone 2020  | Phone         |
-- | 5          | LC SmartGlass  | Glasses       |
-- | 6          | LC T-Shirt XL  | T-Shirt       |
-- +------------+----------------+---------------+

-- Result table:
-- +------------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+
-- | Category   | Monday    | Tuesday   | Wednesday | Thursday  | Friday    | Saturday  | Sunday    |
-- +------------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+
-- | Book       | 20        | 5         | 0         | 0         | 10        | 0         | 0         |
-- | Glasses    | 0         | 0         | 0         | 0         | 5         | 0         | 0         |
-- | Phone      | 0         | 0         | 5         | 1         | 0         | 0         | 10        |
-- | T-Shirt    | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
-- +------------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+
-- On Monday (2020-06-01, 2020-06-08) were sold a total of 20 units (10 + 10) in the category Book (ids: 1, 2).
-- On Tuesday (2020-06-02) were sold a total of 5 units  in the category Book (ids: 1, 2).
-- On Wednesday (2020-06-03) were sold a total of 5 units in the category Phone (ids: 3, 4).
-- On Thursday (2020-06-04) were sold a total of 1 unit in the category Phone (ids: 3, 4).
-- On Friday (2020-06-05) were sold 10 units in the category Book (ids: 1, 2) and 5 units in Glasses (ids: 5).
-- On Saturday there are no items sold.
-- On Sunday (2020-06-14, 2020-06-21) were sold a total of 10 units (5 +5) in the category Phone (ids: 3, 4).
-- There are no sales of T-Shirt.

-- ======= Solution
================================================================================

with t1 as(
select distinct item_category,
case when dayname(order_date)='Monday' then sum(quantity) over(partition by item_category,dayname(order_date))
else 0 end as Monday,
```

```
Case when dayname(order_date)='Tuesday' then sum(quantity) over(partition by item_category,dayname(order_date))
else 0 end as Tuesday,
Case when dayname(order_date)='Wednesday' then sum(quantity) over(partition by
item_category,dayname(order_date)) else 0 end as Wednesday,
Case when dayname(order_date)='Thursday' then sum(quantity) over(partition by
item_category,dayname(order_date)) else 0 end as Thursday,
Case when dayname(order_date)='Friday' then sum(quantity) over(partition by item_category,dayname(order_date))
else 0 end as Friday,
Case when dayname(order_date)='Saturday' then sum(quantity) over(partition by item_category,dayname(order_date))
else 0 end as Saturday,
Case when dayname(order_date)='Sunday' then sum(quantity) over(partition by item_category,dayname(order_date))
else 0 end as Sunday
from orders o
right join items i
using (item_id))

select item_category as category, sum(Monday) as Monday, sum(Tuesday) as Tuesday, sum(Wednesday) Wednesday,
sum(Thursday) Thursday,
sum(Friday) Friday, sum(Saturday) Saturday, sum(Sunday) Sunday
from t1
group by item_category

 -- ##########################################################################
 -- Question 108
-- Given two tables as below, write a query to display the comparison result (higher/lower/same) of the
-- average salary of employees in a department to the company's average salary.


-- Table: salary
-- | id | employee_id | amount | pay_date   |
-- |----|-------------|--------|------------|
-- | 1  | 1           | 9000   | 2017-03-31 |
-- | 2  | 2           | 6000   | 2017-03-31 |
-- | 3  | 3           | 10000  | 2017-03-31 |
-- | 4  | 1           | 7000   | 2017-02-28 |
-- | 5  | 2           | 6000   | 2017-02-28 |
-- | 6  | 3           | 8000   | 2017-02-28 |


-- The employee_id column refers to the employee_id in the following table employee.


-- | employee_id | department_id |
-- |-------------|---------------|
-- | 1           | 1             |
-- | 2           | 2             |
-- | 3           | 2             |


-- So for the sample data above, the result is:
```

-- | pay_month | department_id | comparison  |
-- |-----------|---------------|-------------|
-- | 2017-03   | 1             | higher      |
-- | 2017-03   | 2             | lower       |
-- | 2017-02   | 1             | same        |
-- | 2017-02   | 2             | same        |

-- Explanation

-- In March, the company's average salary is (9000+6000+10000)/3 = 8333.33...

-- The average salary for department '1' is 9000, which is the salary of employee_id '1' since there is only one employee in this department. So the comparison result is 'higher' since 9000 > 8333.33 obviously.

-- The average salary of department '2' is (6000 + 10000)/2 = 8000, which is the average of employee_id '2' and '3'. So the comparison result is 'lower' since 8000 < 8333.33.

-- With he same formula for the average salary comparison in February, the result is 'same' since both the department '1' and '2' have the same average salary with the company, which is 7000.

-- ======= Solution
==========

```
with t1 as(
select date_format(pay_date,'%Y-%m') as pay_month, department_id, avg(amount) over(partition by
month(pay_date),department_id) as dept_avg,
avg(amount) over(partition by month(pay_date)) as comp_avg
from salary s join employee e
using (employee_id))

select distinct pay_month, department_id,
case when dept_avg>comp_avg then "higher"
when dept_avg = comp_avg then "same"
else "lower"
end as comparison
from t1
order by 1 desc
```

-- ######################################################################
-- Question 102
-- The Employee table holds the salary information in a year.

-- Write a SQL to get the cumulative sum of an employee's salary over a period of 3 months but exclude the most recent month.

-- The result should be displayed by 'Id' ascending, and then by 'Month' descending.

-- Example
-- Input

-- | Id | Month | Salary |
-- |----|-------|--------|
-- | 1  | 1     | 20     |
-- | 2  | 1     | 20     |
-- | 1  | 2     | 30     |
-- | 2  | 2     | 30     |
-- | 3  | 2     | 40     |
-- | 1  | 3     | 40     |
-- | 3  | 3     | 60     |
-- | 1  | 4     | 60     |
-- | 3  | 4     | 70     |
-- Output

-- | Id | Month | Salary |
-- |----|-------|--------|
-- | 1  | 3     | 90     |
-- | 1  | 2     | 50     |
-- | 1  | 1     | 20     |
-- | 2  | 1     | 20     |
-- | 3  | 3     | 100    |
-- | 3  | 2     | 40     |

-- Explanation
-- Employee '1' has 3 salary records for the following 3 months except the most recent month '4': salary 40 for month '3', 30 for month '2' and 20 for month '1'
-- So the cumulative sum of salary of this employee over 3 months is 90(40+30+20), 50(30+20) and 20 respectively.

-- | Id | Month | Salary |
-- |----|-------|--------|
-- | 1  | 3     | 90     |
-- | 1  | 2     | 50     |
-- | 1  | 1     | 20     |
-- Employee '2' only has one salary record (month '1') except its most recent month '2'.
-- | Id | Month | Salary |
-- |----|-------|--------|
-- | 2  | 1     | 20     |

-- Employ '3' has two salary records except its most recent pay month '4': month '3' with 60 and month '2' with 40. So the cumulative salary is as following.
-- | Id | Month | Salary |
-- |----|-------|--------|
-- | 3  | 3     | 100    |
-- | 3  | 2     | 40     |

-- ======= Solution
==========

```
with t1 as(
select *, max(month) over(partition by id) as recent_month
from employee)

select id, month, sum(salary) over(partition by id order by month rows between 2 preceding and current row) as salary
from t1
where month<recent_month
order by 1, 2 desc
```

-- ######################################################################
-- Question 14
-- The Employee table holds all employees. Every employee has an Id, and there is also a column for the department Id.

```
-- +----+-------+--------+--------------+
-- | Id | Name  | Salary | DepartmentId |
-- +----+-------+--------+--------------+
-- | 1  | Joe   | 85000  | 1            |
-- | 2  | Henry | 80000  | 2            |
-- | 3  | Sam   | 60000  | 2            |
-- | 4  | Max   | 90000  | 1            |
-- | 5  | Janet | 69000  | 1            |
-- | 6  | Randy | 85000  | 1            |
-- | 7  | Will  | 70000  | 1            |
-- +----+-------+--------+--------------+
```

-- The Department table holds all departments of the company.

```
-- +----+----------+
-- | Id | Name     |
-- +----+----------+
-- | 1  | IT       |
-- | 2  | Sales    |
-- +----+----------+
```

-- Write a SQL query to find employees who earn the top three salaries in each of the department. For the above tables, your SQL query should return the following rows (order of rows does not matter).

```
-- +------------+----------+--------+
-- | Department | Employee | Salary |
-- +------------+----------+--------+
-- | IT         | Max      | 90000  |
-- | IT         | Randy    | 85000  |
-- | IT         | Joe      | 85000  |
-- | IT         | Will     | 70000  |
-- | Sales      | Henry    | 80000  |
-- | Sales      | Sam      | 60000  |
-- +------------+----------+--------+
```

```
-- Explanation:

-- In IT department, Max earns the highest salary, both Randy and Joe earn the second highest salary,
-- and Will earns the third highest salary.
-- There are only two employees in the Sales department,
-- Henry earns the highest salary while Sam earns the second highest salary.

-- ======= Solution
================================================================================

select a.department, a.employee, a.salary
from (
select d.name as department, e.name as employee, salary,
   dense_rank() over(Partition by d.name order by salary desc) as rk
from Employee e join Department d
on e.departmentid = d.id) a
where a.rk<4

 -- ######################################################################
 -- Question 107
-- The Numbers table keeps the value of number and its frequency.

-- +----------+-------------+
-- |  Number  |  Frequency  |
-- +----------+-------------|
-- |  0       |  7          |
-- |  1       |  1          |
-- |  2       |  3          |
-- |  3       |  1          |
-- +----------+-------------+
-- In this table, the numbers are 0, 0, 0, 0, 0, 0, 0, 1, 2, 2, 2, 3, so the median is (0 + 0) / 2 = 0.

-- +--------+
-- | median |
-- +--------|
-- | 0.0000 |
-- +--------+
-- Write a query to find the median of all numbers and name the result as median.

-- ======= Solution
================================================================================

with t1 as(
select *,
sum(frequency) over(order by number) as cum_sum, (sum(frequency) over())/2 as middle
from numbers)

select avg(number) as median
from t1
where middle between (cum_sum - frequency) and cum_sum
```

```
-- ##########################################################################
-- Question 106
-- Table: Student

-- +---------------------+---------+
-- | Column Name         | Type    |
-- +---------------------+---------+
-- | student_id          | int     |
-- | student_name        | varchar |
-- +---------------------+---------+
-- student_id is the primary key for this table.
-- student_name is the name of the student.


-- Table: Exam

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | exam_id       | int     |
-- | student_id    | int     |
-- | score         | int     |
-- +---------------+---------+
-- (exam_id, student_id) is the primary key for this table.
-- Student with student_id got score points in exam with id exam_id.


-- A "quite" student is the one who took at least one exam and didn't score neither the high score nor the low score.

-- Write an SQL query to report the students (student_id, student_name) being "quiet" in ALL exams.

-- Don't return the student who has never taken any exam. Return the result table ordered by student_id.

-- The query result format is in the following example.



-- Student table:
-- +-------------+---------------+
-- | student_id  | student_name  |
-- +-------------+---------------+
-- | 1           | Daniel        |
-- | 2           | Jade          |
-- | 3           | Stella        |
-- | 4           | Jonathan      |
-- | 5           | Will          |
-- +-------------+---------------+

-- Exam table:
-- +------------+--------------+-----------+
```

```
-- | exam_id    | student_id   | score     |
-- +------------+--------------+-----------+
-- | 10         |    1         |   70      |
-- | 10         |    2         |   80      |
-- | 10         |    3         |   90      |
-- | 20         |    1         |   80      |
-- | 30         |    1         |   70      |
-- | 30         |    3         |   80      |
-- | 30         |    4         |   90      |
-- | 40         |    1         |   60      |
-- | 40         |    2         |   70      |
-- | 40         |    4         |   80      |
-- +------------+--------------+-----------+

-- Result table:
-- +-------------+---------------+
-- | student_id  | student_name  |
-- +-------------+---------------+
-- | 2           | Jade          |
-- +-------------+---------------+

-- For exam 1: Student 1 and 3 hold the lowest and high score respectively.
-- For exam 2: Student 1 hold both highest and lowest score.
-- For exam 3 and 4: Studnet 1 and 4 hold the lowest and high score respectively.
-- Student 2 and 5 have never got the highest or lowest in any of the exam.
-- Since student 5 is not taking any exam, he is excluded from the result.
-- So, we only return the information of Student 2.

-- ======= Solution
================================================================================

with t1 as(
select student_id
from
(select *,
min(score) over(partition by exam_id) as least,
max(score) over(partition by exam_id) as most
from exam) a
where least = score or most = score)


select distinct student_id, student_name
from exam join student
using (student_id)
where student_id != all(select student_id from t1)
order by 1

 -- ######################################################################
 -- Question 111
-- Table: Activity
```

```
-- +--------------+---------+
-- | Column Name  | Type    |
-- +--------------+---------+
-- | player_id    | int     |
-- | device_id    | int     |
-- | event_date   | date    |
-- | games_played | int     |
-- +--------------+---------+
-- (player_id, event_date) is the primary key of this table.
-- This table shows the activity of players of some game.
-- Each row is a record of a player who logged in and played a number of games (possibly 0) before logging out on some day using some device.


-- We define the install date of a player to be the first login day of that player.

-- We also define day 1 retention of some date X to be the number of players whose install date is X and they logged back in on the day right after X, divided by the number of players whose install date is X, rounded to 2 decimal places.

-- Write an SQL query that reports for each install date, the number of players that installed the game on that day and the day 1 retention.

-- The query result format is in the following example:

-- Activity table:
-- +-----------+-----------+------------+--------------+
-- | player_id | device_id | event_date | games_played |
-- +-----------+-----------+------------+--------------+
-- | 1         | 2         | 2016-03-01 | 5            |
-- | 1         | 2         | 2016-03-02 | 6            |
-- | 2         | 3         | 2017-06-25 | 1            |
-- | 3         | 1         | 2016-03-01 | 0            |
-- | 3         | 4         | 2016-07-03 | 5            |
-- +-----------+-----------+------------+--------------+

-- Result table:
-- +------------+----------+----------------+
-- | install_dt | installs | Day1_retention |
-- +------------+----------+----------------+
-- | 2016-03-01 | 2        | 0.50           |
-- | 2017-06-25 | 1        | 0.00           |
-- +------------+----------+----------------+
-- Player 1 and 3 installed the game on 2016-03-01 but only player 1 logged back in on 2016-03-02 so the
-- day 1 retention of 2016-03-01 is 1 / 2 = 0.50
-- Player 2 installed the game on 2017-06-25 but didn't log back in on 2017-06-26 so the day 1 retention of 2017-06-25 is 0 / 1 = 0.00

-- ======= Solution
================================================================================

with t1 as(
```

```
select *,
row_number() over(partition by player_id order by event_date) as rnk,
min(event_date) over(partition by player_id) as install_dt,
lead(event_date,1) over(partition by player_id order by event_date) as nxt
from Activity)

select distinct install_dt,
count(distinct player_id) as installs,
round(sum(case when nxt=event_date+1 then 1 else 0 end)/count(distinct player_id),2) as Day1_retention
from t1
where rnk = 1
group by 1
order by 1

 -- ######################################################################
 -- Question 99
-- X city built a new stadium, each day many people visit it and the stats are saved as these columns: id, visit_date, people

-- Please write a query to display the records which have 3 or more consecutive rows and the amount of people more than 100(inclusive).

-- For example, the table stadium:
-- +------+------------+-----------+
-- | id   | visit_date | people    |
-- +------+------------+-----------+
-- | 1    | 2017-01-01 | 10        |
-- | 2    | 2017-01-02 | 109       |
-- | 3    | 2017-01-03 | 150       |
-- | 4    | 2017-01-04 | 99        |
-- | 5    | 2017-01-05 | 145       |
-- | 6    | 2017-01-06 | 1455      |
-- | 7    | 2017-01-07 | 199       |
-- | 8    | 2017-01-08 | 188       |
-- +------+------------+-----------+
-- For the sample data above, the output is:

-- +------+------------+-----------+
-- | id   | visit_date | people    |
-- +------+------------+-----------+
-- | 5    | 2017-01-05 | 145       |
-- | 6    | 2017-01-06 | 1455      |
-- | 7    | 2017-01-07 | 199       |
-- | 8    | 2017-01-08 | 188       |
-- +------+------------+-----------+
-- Note:
-- Each day only have one row record, and the dates are increasing with id increasing.

-- ======= Solution
================================================================================
```

```
WITH t1 AS (
        SELECT id,
            visit_date,
            people,
            id - ROW_NUMBER() OVER(ORDER BY visit_date) AS dates
          FROM stadium
        WHERE people >= 100)

SELECT t1.id,
    t1.visit_date,
    t1people
FROM t1
LEFT JOIN (
        SELECT dates,
            COUNT(*) as total
          FROM t1
        GROUP BY dates) AS b
USING (dates)
WHERE b.total > 2


 -- ##########################################################################
 -- Question 103
-- Table: Users

-- +----------------+---------+
-- | Column Name    | Type    |
-- +----------------+---------+
-- | user_id        | int     |
-- | join_date      | date    |
-- | favorite_brand | varchar |
-- +----------------+---------+
-- user_id is the primary key of this table.
-- This table has the info of the users of an online shopping website where users can sell and buy items.
-- Table: Orders

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | order_id      | int     |
-- | order_date    | date    |
-- | item_id       | int     |
-- | buyer_id      | int     |
-- | seller_id     | int     |
-- +---------------+---------+
-- order_id is the primary key of this table.
-- item_id is a foreign key to the Items table.
-- buyer_id and seller_id are foreign keys to the Users table.
-- Table: Items

-- +---------------+---------+
```

-- | Column Name   | Type    |
-- +---------------+---------+
-- | item_id       | int     |
-- | item_brand    | varchar |
-- +---------------+---------+
-- item_id is the primary key of this table.


-- Write an SQL query to find for each user, whether the brand of the second item (by date) they sold is their favorite brand. If a user sold less than two items, report the answer for that user as no.

-- It is guaranteed that no seller sold more than one item on a day.

-- The query result format is in the following example:

-- Users table:
-- +---------+------------+----------------+
-- | user_id | join_date  | favorite_brand |
-- +---------+------------+----------------+
-- | 1       | 2019-01-01 | Lenovo         |
-- | 2       | 2019-02-09 | Samsung        |
-- | 3       | 2019-01-19 | LG             |
-- | 4       | 2019-05-21 | HP             |
-- +---------+------------+----------------+

-- Orders table:
-- +----------+------------+---------+----------+-----------+
-- | order_id | order_date | item_id | buyer_id | seller_id |
-- +----------+------------+---------+----------+-----------+
-- | 1        | 2019-08-01 | 4       | 1        | 2         |
-- | 2        | 2019-08-02 | 2       | 1        | 3         |
-- | 3        | 2019-08-03 | 3       | 2        | 3         |
-- | 4        | 2019-08-04 | 1       | 4        | 2         |
-- | 5        | 2019-08-04 | 1       | 3        | 4         |
-- | 6        | 2019-08-05 | 2       | 2        | 4         |
-- +----------+------------+---------+----------+-----------+

-- Items table:
-- +---------+------------+
-- | item_id | item_brand |
-- +---------+------------+
-- | 1       | Samsung    |
-- | 2       | Lenovo     |
-- | 3       | LG         |
-- | 4       | HP         |
-- +---------+------------+

-- Result table:
-- +-----------+--------------------+
-- | seller_id | 2nd_item_fav_brand |
-- +-----------+--------------------+

```
-- | 1       | no              |
-- | 2       | yes             |
-- | 3       | yes             |
-- | 4       | no              |
-- +-----------+-------------------+

-- The answer for the user with id 1 is no because they sold nothing.
-- The answer for the users with id 2 and 3 is yes because the brands of their second sold items are their favorite brands.
-- The answer for the user with id 4 is no because the brand of their second sold item is not their favorite brand.

-- ======= Solution
================================================================================

with t1 as(
select user_id,
case when favorite_brand = item_brand then "yes"
else "no"
end as 2nd_item_fav_brand
from users u left join
(select o.item_id, seller_id, item_brand, rank() over(partition by seller_id order by order_date) as rk
from orders o join items i
using (item_id)) a
on u.user_id = a.seller_id
where a.rk = 2)

select u.user_id as seller_id, coalesce(2nd_item_fav_brand,"no") as 2nd_item_fav_brand
from users u left join t1
using(user_id)

 -- ########################################################################
 -- Question 105
-- The Employee table holds all employees. The employee table has three columns: Employee Id, Company Name, and Salary.

-- +-----+------------+--------+
-- |Id   | Company    | Salary |
-- +-----+------------+--------+
-- |1    | A          | 2341   |
-- |2    | A          | 341    |
-- |3    | A          | 15     |
-- |4    | A          | 15314  |
-- |5    | A          | 451    |
-- |6    | A          | 513    |
-- |7    | B          | 15     |
-- |8    | B          | 13     |
-- |9    | B          | 1154   |
-- |10   | B          | 1345   |
-- |11   | B          | 1221   |
-- |12   | B          | 234    |
-- |13   | C          | 2345   |
-- |14   | C          | 2645   |
```

```
-- |15  | C        | 2645  |
-- |16  | C        | 2652  |
-- |17  | C        | 65    |
-- +-----+------------+--------+
```
-- Write a SQL query to find the median salary of each company. Bonus points if you can solve it without using any built-in SQL functions.

```
-- +-----+------------+--------+
-- |Id  | Company    | Salary |
-- +-----+------------+--------+
-- |5   | A          | 451    |
-- |6   | A          | 513    |
-- |12  | B          | 234    |
-- |9   | B          | 1154   |
-- |14  | C          | 2645   |
-- +-----+------------+--------+
```

-- ======= Solution
==========

```
select id, company, salary
from
(select *,
row_number() over(partition by company order by salary) as rn,
count(*) over(partition by company) as cnt
from employee) a
where rn between cnt/2 and cnt/2+1--Question 101
```
-- Table: Visits

```
-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | user_id       | int     |
-- | visit_date    | date    |
-- +---------------+---------+
```
-- (user_id, visit_date) is the primary key for this table.
-- Each row of this table indicates that user_id has visited the bank in visit_date.

-- Table: Transactions

```
-- +------------------+---------+
-- | Column Name      | Type    |
-- +------------------+---------+
-- | user_id          | int     |
-- | transaction_date | date    |
-- | amount           | int     |
-- +------------------+---------+
```
-- There is no primary key for this table, it may contain duplicates.
-- Each row of this table indicates that user_id has done a transaction of amount in transaction_date.

-- It is guaranteed that the user has visited the bank in the transaction_date.(i.e The Visits table contains (user_id, transaction_date) in one row)

-- A bank wants to draw a chart of the number of transactions bank visitors did in one visit to the bank and the corresponding number of visitors who have done this number of transaction in one visit.

-- Write an SQL query to find how many users visited the bank and didn't do any transactions, how many visited the bank and did one transaction and so on.

-- The result table will contain two columns:

-- transactions_count which is the number of transactions done in one visit.
-- visits_count which is the corresponding number of users who did transactions_count in one visit to the bank.
-- transactions_count should take all values from 0 to max(transactions_count) done by one or more users.

-- Order the result table by transactions_count.

-- The query result format is in the following example:

-- Visits table:
-- +---------+------------+
-- | user_id | visit_date |
-- +---------+------------+
-- | 1       | 2020-01-01 |
-- | 2       | 2020-01-02 |
-- | 12      | 2020-01-01 |
-- | 19      | 2020-01-03 |
-- | 1       | 2020-01-02 |
-- | 2       | 2020-01-03 |
-- | 1       | 2020-01-04 |
-- | 7       | 2020-01-11 |
-- | 9       | 2020-01-25 |
-- | 8       | 2020-01-28 |
-- +---------+------------+
-- Transactions table:
-- +---------+------------------+--------+
-- | user_id | transaction_date | amount |
-- +---------+------------------+--------+
-- | 1       | 2020-01-02       | 120    |
-- | 2       | 2020-01-03       | 22     |
-- | 7       | 2020-01-11       | 232    |
-- | 1       | 2020-01-04       | 7      |
-- | 9       | 2020-01-25       | 33     |
-- | 9       | 2020-01-25       | 66     |
-- | 8       | 2020-01-28       | 1      |
-- | 9       | 2020-01-25       | 99     |
-- +---------+------------------+--------+
-- Result table:
-- +--------------------+--------------+
-- | transactions_count | visits_count |

```
-- +--------------------+--------------+
-- | 0                  | 4            |
-- | 1                  | 5            |
-- | 2                  | 0            |
-- | 3                  | 1            |
-- +--------------------+--------------+
-- * For transactions_count = 0, The visits (1, "2020-01-01"), (2, "2020-01-02"), (12, "2020-01-01") and (19, "2020-01-03") did no transactions so visits_count = 4.
-- * For transactions_count = 1, The visits (2, "2020-01-03"), (7, "2020-01-11"), (8, "2020-01-28"), (1, "2020-01-02") and (1, "2020-01-04") did one transaction so visits_count = 5.
-- * For transactions_count = 2, No customers visited the bank and did two transactions so visits_count = 0.
-- * For transactions_count = 3, The visit (9, "2020-01-25") did three transactions so visits_count = 1.
-- * For transactions_count >= 4, No customers visited the bank and did more than three transactions so we will stop at transactions_count = 3

-- ======= Solution
================================================================================

WITH RECURSIVE t1 AS(
            SELECT visit_date,
                 COALESCE(num_visits,0) as num_visits,
                 COALESCE(num_trans,0) as num_trans
            FROM ((
                SELECT visit_date, user_id, COUNT(*) as num_visits
                FROM visits
                GROUP BY 1, 2) AS a
               LEFT JOIN
                (
                 SELECT transaction_date,
                     user_id,
                     count(*) as num_trans
                  FROM transactions
                 GROUP BY 1, 2) AS b
               ON a.visit_date = b.transaction_date and a.user_id = b.user_id)
             ),

        t2 AS (
              SELECT MAX(num_trans) as trans
                FROM t1
              UNION ALL
              SELECT trans-1
                FROM t2
              WHERE trans >= 1)

SELECT trans as transactions_count,
    COALESCE(visits_count,0) as visits_count
 FROM t2 LEFT JOIN (
            SELECT num_trans as transactions_count, COALESCE(COUNT(*),0) as visits_count
            FROM t1
            GROUP BY 1
            ORDER BY 1) AS a
```

```
ON a.transactions_count = t2.trans
ORDER BY 1


 -- ######################################################################
 -- Question 104
-- Table: Failed

-- +--------------+---------+
-- | Column Name  | Type    |
-- +--------------+---------+
-- | fail_date    | date    |
-- +--------------+---------+
-- Primary key for this table is fail_date.
-- Failed table contains the days of failed tasks.
-- Table: Succeeded

-- +--------------+---------+
-- | Column Name  | Type    |
-- +--------------+---------+
-- | success_date | date    |
-- +--------------+---------+
-- Primary key for this table is success_date.
-- Succeeded table contains the days of succeeded tasks.


-- A system is running one task every day. Every task is independent of the previous tasks. The tasks can fail or succeed.

-- Write an SQL query to generate a report of period_state for each continuous interval of days in the period from 2019-01-01 to 2019-12-31.

-- period_state is 'failed' if tasks in this interval failed or 'succeeded' if tasks in this interval succeeded. Interval of days are retrieved as start_date and end_date.

-- Order result by start_date.

-- The query result format is in the following example:

-- Failed table:
-- +-------------------+
-- | fail_date         |
-- +-------------------+
-- | 2018-12-28        |
-- | 2018-12-29        |
-- | 2019-01-04        |
-- | 2019-01-05        |
-- +-------------------+

-- Succeeded table:
-- +-------------------+
-- | success_date      |
```

```
-- +------------------+
-- | 2018-12-30       |
-- | 2018-12-31       |
-- | 2019-01-01       |
-- | 2019-01-02       |
-- | 2019-01-03       |
-- | 2019-01-06       |
-- +------------------+


-- Result table:
-- +--------------+--------------+--------------+
-- | period_state | start_date   | end_date     |
-- +--------------+--------------+--------------+
-- | succeeded    | 2019-01-01   | 2019-01-03   |
-- | failed       | 2019-01-04   | 2019-01-05   |
-- | succeeded    | 2019-01-06   | 2019-01-06   |
-- +--------------+--------------+--------------+

-- The report ignored the system state in 2018 as we care about the system in the period 2019-01-01 to 2019-12-31.
-- From 2019-01-01 to 2019-01-03 all tasks succeeded and the system state was "succeeded".
-- From 2019-01-04 to 2019-01-05 all tasks failed and system state was "failed".
-- From 2019-01-06 to 2019-01-06 all tasks succeeded and system state was "succeeded".

-- ======= Solution
==========================================================================================

with t1 as(
select min(success_date) as start_date, max(success_date) as end_date, state
from(
select *, date_sub(success_date, interval row_number() over(order by success_date) day) as diff, 1 as state
from succeeded
where success_date between "2019-01-01" and "2019-12-31") a
group by diff),

t2 as(
select min(fail_date) as start_date, max(fail_date) as end_date, state
from(
select *, date_sub(fail_date, interval row_number() over(order by fail_date) day) as diff, 0 as state
from failed
where fail_date between "2019-01-01" and "2019-12-31") b
group by diff)



select
case when c.state = 1 then "succeeded"
else "failed"
end as period_state,start_date, end_date
from(
select *
from t1
```

```
union all
select *
from t2) c
order by start_date

 -- ##########################################################################
 -- Question 112
-- Table: Orders

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | order_id      | int     |
-- | customer_id   | int     |
-- | order_date    | date    |
-- | item_id       | varchar |
-- | quantity      | int     |
-- +---------------+---------+
-- (ordered_id, item_id) is the primary key for this table.
-- This table contains information of the orders placed.
-- order_date is the date when item_id was ordered by the customer with id customer_id.


-- Table: Items

-- +---------------------+---------+
-- | Column Name         | Type    |
-- +---------------------+---------+
-- | item_id             | varchar |
-- | item_name           | varchar |
-- | item_category       | varchar |
-- +---------------------+---------+
-- item_id is the primary key for this table.
-- item_name is the name of the item.
-- item_category is the category of the item.


-- You are the business owner and would like to obtain a sales report for category items and day of the week.

-- Write an SQL query to report how many units in each category have been ordered on each day of the week.

-- Return the result table ordered by category.

-- The query result format is in the following example:



-- Orders table:
-- +------------+--------------+-------------+--------------+-------------+
-- | order_id   | customer_id  | order_date  | item_id      | quantity    |
-- +------------+--------------+-------------+--------------+-------------+
```

```
-- | 1        | 1          | 2020-06-01  | 1          | 10        |
-- | 2        | 1          | 2020-06-08  | 2          | 10        |
-- | 3        | 2          | 2020-06-02  | 1          | 5         |
-- | 4        | 3          | 2020-06-03  | 3          | 5         |
-- | 5        | 4          | 2020-06-04  | 4          | 1         |
-- | 6        | 4          | 2020-06-05  | 5          | 5         |
-- | 7        | 5          | 2020-06-05  | 1          | 10        |
-- | 8        | 5          | 2020-06-14  | 4          | 5         |
-- | 9        | 5          | 2020-06-21  | 3          | 5         |
-- +----------+------------+-------------+------------+-----------+

-- Items table:
-- +------------+---------------+---------------+
-- | item_id    | item_name     | item_category |
-- +------------+---------------+---------------+
-- | 1          | LC Alg. Book  | Book          |
-- | 2          | LC DB. Book   | Book          |
-- | 3          | LC SmarthPhone| Phone         |
-- | 4          | LC Phone 2020 | Phone         |
-- | 5          | LC SmartGlass | Glasses       |
-- | 6          | LC T-Shirt XL | T-Shirt       |
-- +------------+---------------+---------------+

-- Result table:
-- +------------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+
-- | Category   | Monday    | Tuesday   | Wednesday | Thursday  | Friday    | Saturday  | Sunday    |
-- +------------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+
-- | Book       | 20        | 5         | 0         | 0         | 10        | 0         | 0         |
-- | Glasses    | 0         | 0         | 0         | 0         | 5         | 0         | 0         |
-- | Phone      | 0         | 0         | 5         | 1         | 0         | 0         | 10        |
-- | T-Shirt    | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
-- +------------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+
-- On Monday (2020-06-01, 2020-06-08) were sold a total of 20 units (10 + 10) in the category Book (ids: 1, 2).
-- On Tuesday (2020-06-02) were sold a total of 5 units  in the category Book (ids: 1, 2).
-- On Wednesday (2020-06-03) were sold a total of 5 units in the category Phone (ids: 3, 4).
-- On Thursday (2020-06-04) were sold a total of 1 unit in the category Phone (ids: 3, 4).
-- On Friday (2020-06-05) were sold 10 units in the category Book (ids: 1, 2) and 5 units in Glasses (ids: 5).
-- On Saturday there are no items sold.
-- On Sunday (2020-06-14, 2020-06-21) were sold a total of 10 units (5 +5) in the category Phone (ids: 3, 4).
-- There are no sales of T-Shirt.

-- ======= Solution
================================================================================

with t1 as(
select distinct item_category,
case when dayname(order_date)='Monday' then sum(quantity) over(partition by item_category,dayname(order_date))
else 0 end as Monday,
Case when dayname(order_date)='Tuesday' then sum(quantity) over(partition by item_category,dayname(order_date))
else 0 end as Tuesday,
```

```
Case when dayname(order_date)='Wednesday' then sum(quantity) over(partition by
item_category,dayname(order_date)) else 0 end as Wednesday,
Case when dayname(order_date)='Thursday' then sum(quantity) over(partition by
item_category,dayname(order_date)) else 0 end as Thursday,
Case when dayname(order_date)='Friday' then sum(quantity) over(partition by item_category,dayname(order_date))
else 0 end as Friday,
Case when dayname(order_date)='Saturday' then sum(quantity) over(partition by item_category,dayname(order_date))
else 0 end as Saturday,
Case when dayname(order_date)='Sunday' then sum(quantity) over(partition by item_category,dayname(order_date))
else 0 end as Sunday
from orders o
right join items i
using (item_id))

select item_category as category, sum(Monday) as Monday, sum(Tuesday) as Tuesday, sum(Wednesday) Wednesday,
sum(Thursday) Thursday,
sum(Friday) Friday, sum(Saturday) Saturday, sum(Sunday) Sunday
from t1
group by item_category

 -- ######################################################################
 -- Question 108
-- Given two tables as below, write a query to display the comparison result (higher/lower/same) of the
-- average salary of employees in a department to the company's average salary.


-- Table: salary
-- | id | employee_id | amount | pay_date   |
-- |-

 -- ######################################################################
 -- Question 105
-- A U.S graduate school has students from Asia, Europe and America. The students' location information are stored in
table student as below.


-- | name   | continent |
-- |--------|-----------|
-- | Jack   | America   |
-- | Pascal | Europe    |
-- | Xi     | Asia      |
-- | Jane   | America   |


-- Pivot the continent column in this table so that each name is sorted alphabetically and displayed underneath its
corresponding continent. The output headers should be America, Asia and Europe respectively. It is guaranteed that the
student number from America is no less than either Asia or Europe.


-- For the sample input, the output is:
```

```
-- | America | Asia | Europe |
-- |---------|------|--------|
-- | Jack    | Xi   | Pascal |
-- | Jane    |      |        |

-- ======= Solution
================================================================================

select min(case when continent = 'America' then name end) as America,
min(case when continent = 'Asia' then name end) as Asia,
min(case when continent = 'Europe' then name end) as Europe
from
(select *, row_number() over(partition by continent order by name) as rn
from student) a
group by rn

 -- ######################################################################
 -- Question 114
-- Table: Product

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | product_id    | int     |
-- | product_name  | varchar |
-- +---------------+---------+
-- product_id is the primary key for this table.
-- product_name is the name of the product.


-- Table: Sales

-- +---------------------+---------+
-- | Column Name         | Type    |
-- +---------------------+---------+
-- | product_id          | int     |
-- | period_start        | varchar |
-- | period_end          | date    |
-- | average_daily_sales | int     |
-- +---------------------+---------+
-- product_id is the primary key for this table.
-- period_start and period_end indicates the start and end date for sales period, both dates are inclusive.
-- The average_daily_sales column holds the average daily sales amount of the items for the period.

-- Write an SQL query to report the Total sales amount of each item for each year, with corresponding product name,
product_id, product_name and report_year.

-- Dates of the sales years are between 2018 to 2020. Return the result table ordered by product_id and report_year.

-- The query result format is in the following example:
```

```
-- Product table:
-- +------------+--------------+
-- | product_id | product_name |
-- +------------+--------------+
-- | 1          | LC Phone     |
-- | 2          | LC T-Shirt   |
-- | 3          | LC Keychain  |
-- +------------+--------------+

-- Sales table:
-- +------------+--------------+-------------+---------------------+
-- | product_id | period_start | period_end  | average_daily_sales |
-- +------------+--------------+-------------+---------------------+
-- | 1          | 2019-01-25   | 2019-02-28  | 100                 |
-- | 2          | 2018-12-01   | 2020-01-01  | 10                  |
-- | 3          | 2019-12-01   | 2020-01-31  | 1                   |
-- +------------+--------------+-------------+---------------------+

-- Result table:
-- +------------+--------------+-------------+--------------+
-- | product_id | product_name | report_year | total_amount |
-- +------------+--------------+-------------+--------------+
-- | 1          | LC Phone     |    2019     | 3500         |
-- | 2          | LC T-Shirt   |    2018     | 310          |
-- | 2          | LC T-Shirt   |    2019     | 3650         |
-- | 2          | LC T-Shirt   |    2020     | 10           |
-- | 3          | LC Keychain  |    2019     | 31           |
-- | 3          | LC Keychain  |    2020     | 31           |
-- +------------+--------------+-------------+--------------+
-- LC Phone was sold for the period of 2019-01-25 to 2019-02-28, and there are 35 days for this period. Total amount 35*100 = 3500.
-- LC T-shirt was sold for the period of 2018-12-01 to 2020-01-01, and there are 31, 365, 1 days for years 2018, 2019 and 2020 respectively.
-- LC Keychain was sold for the period of 2019-12-01 to 2020-01-31, and there are 31, 31 days for years 2019 and 2020 respectively.

-- ======= Solution
================================================================================

SELECT
    b.product_id,
    a.product_name,
    a.yr AS report_year,
    CASE
        WHEN YEAR(b.period_start)=YEAR(b.period_end) AND a.yr=YEAR(b.period_start) THEN
DATEDIFF(b.period_end,b.period_start)+1
        WHEN a.yr=YEAR(b.period_start) THEN DATEDIFF(DATE_FORMAT(b.period_start,'%Y-12-31'),b.period_start)+1
        WHEN a.yr=YEAR(b.period_end) THEN DAYOFYEAR(b.period_end)
        WHEN a.yr>YEAR(b.period_start) AND a.yr<YEAR(b.period_end) THEN 365
```

```
      ELSE 0
   END * average_daily_sales AS total_amount
FROM
   (SELECT product_id,product_name,'2018' AS yr FROM Product
   UNION
   SELECT product_id,product_name,'2019' AS yr FROM Product
   UNION
   SELECT product_id,product_name,'2020' AS yr FROM Product) a
   JOIN
   Sales b
   ON a.product_id=b.product_id
HAVING total_amount > 0
ORDER BY b.product_id,a.yr

 -- ##########################################################################
 -- Question 109
-- Table: Players

-- +-------------+-------+
-- | Column Name | Type  |
-- +-------------+-------+
-- | player_id   | int   |
-- | group_id    | int   |
-- +-------------+-------+
-- player_id is the primary key of this table.
-- Each row of this table indicates the group of each player.
-- Table: Matches

-- +---------------+---------+
-- | Column Name   | Type    |
-- +---------------+---------+
-- | match_id      | int     |
-- | first_player  | int     |
-- | second_player | int     |
-- | first_score   | int     |
-- | second_score  | int     |
-- +---------------+---------+
-- match_id is the primary key of this table.
-- Each row is a record of a match, first_player and second_player contain the player_id of each match.
-- first_score and second_score contain the number of points of the first_player and second_player respectively.
-- You may assume that, in each match, players belongs to the same group.


-- The winner in each group is the player who scored the maximum total points within the group. In the case of a tie,
-- the lowest player_id wins.

-- Write an SQL query to find the winner in each group.

-- The query result format is in the following example:

-- Players table:
```

```
-- +-----------+------------+
-- | player_id | group_id   |
-- +-----------+------------+
-- | 15        | 1          |
-- | 25        | 1          |
-- | 30        | 1          |
-- | 45        | 1          |
-- | 10        | 2          |
-- | 35        | 2          |
-- | 50        | 2          |
-- | 20        | 3          |
-- | 40        | 3          |
-- +-----------+------------+

-- Matches table:
-- +------------+--------------+---------------+-------------+--------------+
-- | match_id   | first_player | second_player | first_score | second_score |
-- +------------+--------------+---------------+-------------+--------------+
-- | 1          | 15           | 45            | 3           | 0            |
-- | 2          | 30           | 25            | 1           | 2            |
-- | 3          | 30           | 15            | 2           | 0            |
-- | 4          | 40           | 20            | 5           | 2            |
-- | 5          | 35           | 50            | 1           | 1            |
-- +------------+--------------+---------------+-------------+--------------+

-- Result table:
-- +-----------+------------+
-- | group_id  | player_id  |
-- +-----------+------------+
-- | 1         | 15         |
-- | 2         | 35         |
-- | 3         | 40         |
-- +-----------+------------+

-- ======= Solution
================================================================================

with t1 as(
select first_player, sum(first_score) as total
from
(select first_player, first_score
from matches
union all
select second_player, second_score
from matches) a
group by 1),

t2 as(
select *, coalesce(total,0) as score
from players p left join t1
on p.player_id = t1.first_player)
```

```
select group_id, player_id
from
(select *, row_number() over(partition by group_id order by group_id, score desc) as rn
from t2) b
where b.rn = 1

 -- ######################################################################
 -- Question 98
-- The Trips table holds all taxi trips. Each trip has a unique Id, while Client_Id and Driver_Id are both foreign keys to the Users_Id at the Users table. Status is an ENUM type of ('completed', 'cancelled_by_driver', 'cancelled_by_client').

-- +----+-----------+-----------+---------+--------------------+----------+
-- | Id | Client_Id | Driver_Id | City_Id |       Status       |Request_at|
-- +----+-----------+-----------+---------+--------------------+----------+
-- | 1  |    1      |    10     |    1    |     completed      |2013-10-01|
-- | 2  |    2      |    11     |    1    | cancelled_by_driver|2013-10-01|
-- | 3  |    3      |    12     |    6    |     completed      |2013-10-01|
-- | 4  |    4      |    13     |    6    | cancelled_by_client|2013-10-01|
-- | 5  |    1      |    10     |    1    |     completed      |2013-10-02|
-- | 6  |    2      |    11     |    6    |     completed      |2013-10-02|
-- | 7  |    3      |    12     |    6    |     completed      |2013-10-02|
-- | 8  |    2      |    12     |   12    |     completed      |2013-10-03|
-- | 9  |    3      |    10     |   12    |     completed      |2013-10-03|
-- | 10 |    4      |    13     |   12    | cancelled_by_driver|2013-10-03|
-- +----+-----------+-----------+---------+--------------------+----------+
-- The Users table holds all users. Each user has an unique Users_Id, and Role is an ENUM type of ('client', 'driver', 'partner').

-- +----------+--------+--------+
-- | Users_Id | Banned |  Role  |
-- +----------+--------+--------+
-- |    1     |   No   | client |
-- |    2     |   Yes  | client |
-- |    3     |   No   | client |
-- |    4     |   No   | client |
-- |    10    |   No   | driver |
-- |    11    |   No   | driver |
-- |    12    |   No   | driver |
-- |    13    |   No   | driver |
-- +----------+--------+--------+
-- Write a SQL query to find the cancellation rate of requests made by unbanned users (both client and driver must be unbanned) between Oct 1, 2013 and Oct 3, 2013. The cancellation rate is computed by dividing the number of canceled (by client or driver) requests made by unbanned users by the total number of requests made by unbanned users.

-- For the above tables, your SQL query should return the following rows with the cancellation rate being rounded to two decimal places.

-- +------------+-------------------+
-- |     Day    | Cancellation Rate |
-- +------------+-------------------+
```

```
-- | 2013-10-01 |      0.33       |
-- | 2013-10-02 |      0.00       |
-- | 2013-10-03 |      0.50       |
-- +------------+-----------------+
-- Credits:
-- Special thanks to @cak1erlizhou for contributing this question, writing the problem description and adding part of the test cases.

-- ======= Solution
================================================================================

with t1 as(
select request_at, count(status) as total
from trips
where client_id = any(select users_id
from users
where banned != 'Yes')
and driver_id = any(select users_id
from users
where banned != 'Yes')
and request_at between '2013-10-01' and '2013-10-03'
group by request_at),

t2 as
( select request_at, count(status) as cancel
from trips
where client_id = any(select users_id
from users
where banned != 'Yes')
and driver_id = any(select users_id
from users
where banned != 'Yes')
and request_at between '2013-10-01' and '2013-10-03'
and status != 'completed'
group by request_at
)

select request_at as Day, coalesce(round((cancel+0.00)/(total+0.00),2),0) as "Cancellation Rate"
from t1 left join t2
using(request_at)


 -- ######################################################################
 -- Question 113
-- Table: Spending

-- +-------------+---------+
-- | Column Name | Type    |
-- +-------------+---------+
-- | user_id     | int     |
-- | spend_date  | date    |
```

-- | platform    | enum    |
-- | amount      | int     |
-- +-------------+---------+
-- The table logs the spendings history of users that make purchases from an online shopping website which has a desktop and a mobile application.
-- (user_id, spend_date, platform) is the primary key of this table.
-- The platform column is an ENUM type of ('desktop', 'mobile').
-- Write an SQL query to find the total number of users and the total amount spent using mobile only, desktop only and both mobile and desktop together for each date.

-- The query result format is in the following example:

-- Spending table:
-- +---------+------------+----------+--------+
-- | user_id | spend_date | platform | amount |
-- +---------+------------+----------+--------+
-- | 1       | 2019-07-01 | mobile   | 100    |
-- | 1       | 2019-07-01 | desktop  | 100    |
-- | 2       | 2019-07-01 | mobile   | 100    |
-- | 2       | 2019-07-02 | mobile   | 100    |
-- | 3       | 2019-07-01 | desktop  | 100    |
-- | 3       | 2019-07-02 | desktop  | 100    |
-- +---------+------------+----------+--------+

-- Result table:
-- +------------+----------+--------------+-------------+
-- | spend_date | platform | total_amount | total_users |
-- +------------+----------+--------------+-------------+
-- | 2019-07-01 | desktop  | 100          | 1           |
-- | 2019-07-01 | mobile   | 100          | 1           |
-- | 2019-07-01 | both     | 200          | 1           |
-- | 2019-07-02 | desktop  | 100          | 1           |
-- | 2019-07-02 | mobile   | 100          | 1           |
-- | 2019-07-02 | both     | 0            | 0           |
-- +------------+----------+--------------+-------------+
-- On 2019-07-01, user 1 purchased using both desktop and mobile, user 2 purchased using mobile only and user 3 purchased using desktop only.
-- On 2019-07-02, user 2 purchased using mobile only, user 3 purchased using desktop only and no one purchased using both platforms.

-- ======= Solution
==========

```
SELECT p.spend_date, p.platform, IFNULL(SUM(amount), 0) total_amount, COUNT(DISTINCT u.user_id) total_users
FROM
(
SELECT DISTINCT(spend_date), 'desktop' platform FROM Spending
UNION
SELECT DISTINCT(spend_date), 'mobile' platform FROM Spending
UNION
SELECT DISTINCT(spend_date), 'both' platform FROM Spending
```

```
) p LEFT JOIN

(SELECT user_id, spend_date, SUM(amount) amount, (CASE WHEN COUNT(DISTINCT platform)>1 THEN "both" ELSE
platform END) platform
FROM Spending
GROUP BY spend_date, user_id) u

ON p.platform = u.platform AND p.spend_date=u.spend_date

GROUP BY p.spend_date, p.platform
```