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# 175. Combine Two Tables

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
```

```sql
SELECT FirstName, LastName, City, State

FROM Person p

LEFT JOIN Address a

ON p.PersonId = a.PersonId;
```

# 176. Second Highest Salary

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                 |

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

```sql
SELECT
IFNULL(
    (SELECT DISTINCT Salary
     FROM Employee
     ORDER BY Salary DESC
     LIMIT 1 OFFSET 1), NULL)
AS SecondHighestSalary
```

```sql
SELECT
    (SELECT DISTINCT Salary
     FROM Employee
    ORDER BY Salary DESC
    LiMIT 1, 1)
AS SecondHighestSalary
```

# 177. Nth Highest Salary

Write a SQL query to get the $n^{th}$ highest salary from the `Employee` table.

```
+----+--------+
| Id | Salary |
+----+--------+
| 1  | 100    |
| 2  | 200    |
| 3  | 300    |
+----+--------+
```

For example, given the above Employee table, the $n^{th}$ highest salary where $n$ = 2 is `200`. If there is no $n^{th}$ highest salary, then the query should return `null`.

```
+------------------------+
| getNthHighestSalary(2) |
+------------------------+
| 200                    |
+------------------------+
```

```sql
CREATE FUNCTION getNthHighestSalary(N INT)RETURNS INT

BEGIN

  DECLARE M INT;

  SET M = N-1;

  RETURN (

      # Write your MySQL query statement below.

      SELECT DISTINCT Salary

      FROM Employee

      ORDER BY Salary DESC

      LIMIT M, 1

  );

END
```

## 178. Rank Scores

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`**.

```
select S.Score, count(*) 'Rank'
from Scores S
join (select distinct Score FROM Scores) S2
 on S.Score <= S2.Score
group by S.Id
order by S.Score desc;
```

```
select Score,(select count(distinct Score) from Score
s where Score >= S.Score) 'Rank'
from Scores S
order by Score desc;
```

# 180. Consecutive Numbers

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               |
+-----------------+
```

```sql
select distinct l1.num as 'ConsecutiveNums'
from Logs l1
join Logs l2 on l1.Id = l2.Id - 1 and l1.Num = l2.Num
join Logs l3 on l2.Id = l3.Id - 1 and l2.Num = l3.Num;
```

# 181. Employees Earning More Than Their Managers

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      |

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

```sql
select a.Name as 'Employee'
from Employee a
join  Employee b on a.ManagerId = b.Id and a.Salary > b.Salary;
```

# 182. Duplicate Emails

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 |
+---------+
```

**Note**: All emails are in lowercase.

```sql
select Email

from Person

group by Email

having count(Email) > 1;
```

# 183. Customers Who Never Order

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       |
```

```
select Name as 'Customers'

from Customers

left join Orders on Customers.Id = Orders.CustomerId

where CustomerId is null
```

# 184. Department Highest Salary

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.

```
select Department.Name as 'Department', Employee.Name Employee, Salary
from Employee
Join Department on Employee.DepartmentId = Department.Id
where (Employee.DepartmentId, Salary) IN
          (
              SELECT DepartmentId, MAX(Salary)
              FROM Employee
              GROUP BY DepartmentId
          )
```

# 185. Department Top Three Salaries

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.

```sql
select d.Name Department, e1.Name Employee, e1.Salary
from Employee e1
join Department d on e1.DepartmentId = d.Id
where 3 > (
              select count(distinct(e2.Salary))
              from Employee e2
              where e2.Salary > e1.Salary
                    and e1.DepartmentId = e2.DepartmentId
           )
```

```sql
select d.Name Department, e1.Name Employee, e1.Salary
from Employee e1
join Department d on e1.DepartmentId = d.Id
join Employee e2 on e2.Salary >= e1.Salary and e1.DepartmentId = e2.Dep
artmentId
group by e1.Id
having count(distinct e2.Salary) <= 3
```

# 196. Delete Duplicate Emails

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  |
+----+------------------+
```

**Note:**

Your output is the whole `Person` table after executing your sql. Use `delete` statement.

```sql
/*
delete p1 from Person p1, Person p2
where p1.Email = p2.Email and p1.Id > p2.Id
*/

delete from Person where Id not in (
    select id from (
        select min(Id) as id
         from Person
        group by Email
    ) as _      # it needs an alias for set
)
```

# 197. Rising Temperature

Table: `Weather`

```
+---------------+---------+
| Column Name   | Type    |
+---------------+---------+
| id            | int     |
| recordDate    | date    |
| temperature   | int     |
+---------------+---------+
id is the primary key for this table.
This table contains information about the temperature in a certain day.
```

Write an SQL query to find all dates' `id` with higher temperature compared to its previous dates (yesterday).

Return the result table in **any order**.

The query result format is in the following example:

```
Weather
+----+------------+-------------+
| id | recordDate | Temperature |
+----+------------+-------------+
| 1  | 2015-01-01 | 10          |
| 2  | 2015-01-02 | 25          |
| 3  | 2015-01-03 | 20          |
| 4  | 2015-01-04 | 30          |
+----+------------+-------------+
```

```
Result table:

+----+

| id |

+----+

| 2  |

| 4  |

+----+

In 2015-01-02, temperature was higher than the previous day (10 -> 25).

In 2015-01-04, temperature was higher than the previous day (30 -> 20).
```

```sql
select a.Id
from Weather a
join Weather b
on a.Temperature > b.Temperature
    and datediff(a.RecordDate, b.RecordDate) = 1
```

# 262. Trips and Users

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        |
+------------+-------------------+
```

```sql
select Request_at Day, Round(sum(Status like 'can%') / count(Client_Id)
                             , 2) as 'Cancellation Rate'
from Trips
where Request_at between '2013-10-01' and '2013-10-03'
      and Client_Id not in (
                                select Users_id
                                from Users
                                where Role = 'client' and Banned ='Yes'
                            )
group by Request_at
```

# 511. Game Play Analysis I

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  |
+-----------+-------------+
```

```sql
select player_id, min(event_date) as 'first_login'
from Activity
group by player_id
```

# 512. Game Play Analysis II

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         |
+-----------+-----------+
```

```sql
select player_id, device_id
from Activity
where (player_id, event_date) in (
                                    select player_id, min(event_date)
                                    from Activity
                                    group by player_id
                                 )
```

# 534. Game Play Analysis III

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.

```
select a.player_id, a.event_date, sum(b.games_played) as 'games_played_
so_far'
from Activity a
join Activity b on a.player_id = b.player_id
                  and a.event_date >= b.event_date
group by a.player_id, a.event_date;
```

```
select player_id, event_date, sum(games_played) over(partition by playe
r_id order by event_date) as 'games_played_so_far'
from  activity;
```

# 550. Game Play Analysis IV

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

```sql
select
    ROUND((select count(*)
        from Activity
        where (player_id, event_date) in
                      (
                          select player_id, Date(min(event_date)+1)
                          from Activity
                          group by player_id
                      )
    ) / count(distinct player_id), 2) as fraction
from Activity;
```

# 569. Median Employee Salary★★

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   |

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

```sql
select Id, Company, Salary
from (
    select Id, Company, Salary,
        row_number() over(partition by Company order by Salary) as rnk,
        count(*) over(partition by Company) as cnt
    from Employee ) t
where rnk in (cnt/2, cnt/2+1, cnt/2+0.5)
```

# 570. Managers with at Least 5 Direct Reports

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.

```sql
select a.Name as 'Name'
from Employee a
join Employee b on b.ManagerId = a.Id
group by a.Id
having count(*) > 4
```

## 571. Find Median Given Frequency of Numbers★★★

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`.

```sql
select avg(Number) as median from
(
    select Number, @c1 + 1 as 'c1',(@c1 := @c1 + Frequency) 'c2', t2.s
    from Numbers
    join (select @c1 := 0) t1
    join (select sum(Frequency) as s from Numbers) t2
    order by Number
) tmp
where c1 <= s/2 + 1 and c2 >= s/2;
```

# 574. Winning Candidate

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:**

1. You may assume **there is no tie**, in other words there will be **only one** winning candidate.

```sql
select a.Name
from Candidate a
join Vote b on a.id = b.CandidateId
group by a.id
order by count(*) desc
limit 0, 1
```

```sql
select Name
from Candidate
where id = (
                select CandidateId
                from Vote
                group by CandidateId
                order by count(*) desc
                limit 1
            )
```

# 577. Employee Bonus

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  |
+-------+-------+
```

```sql
select name, bonus
from Employee a
left join bonus b on a.empId = b.empId
where ifnull(bonus, 0) < 1000;
```

# 578. Get Highest Answer Rate Question

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.

```sql
#count 不计 null 行
select question_id as 'survey_log'
from survey_log
where action <> 'skip'
group by question_id
order by count(answer_id) / (count(*) - count(answer_id)) desc
limit 1
```

```sql
#sum 里面可以加函数
select question_id as survey_log
from survey_log
group by question_id
order by sum(if(action = 'answer', 1, 0)) / sum(if(action = 's
how', 1, 0)) desc
limit 1
```

# 579. Find Cumulative Salary of an Employee★

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 |

```
select Id, Month,
        sum(Salary) over (partition by Id order by Month rows 2 preceding) Salary
from Employee
where (Id, Month) not in (
                            select Id, max(Month)
                            from Employee
                            group by Id
                         )
order by Id, Month desc
```

# 580. Count Student Number in Departments

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 |

```sql
select dept_name, count(student_id) `student_number`

from department a

left join student b on a.dept_id = b.dept_id

group by a.dept_id

order by student_number desc, dept_name
```

# 584. Find Customer Referee

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 |

+------+
```

```sql
#对于null,referee_id <> 2 和 !(referee_id = 2)都不成立

select name

from customer

where ifnull(referee_id, 0) <> 2
```

# 585. Investments in 2016

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:

1. Have the same **TIV_2015** value as one or more other policyholders.
2. 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.

```sql
select sum(TIV_2016) as 'TIV_2016'
from  insurance
where TIV_2015 in (
                      select TIV_2015
                      from insurance
                      group by TIV_2015
                      having count(*) > 1
                  )
and concat(lat, lon) in (
                            select concat(lat,lon)
                            from insurance
                            group by concat(lat,lon)
                            having count(*) = 1
                        )
```

```sql
SELECT SUM(TIV_2016) as TIV_2016
FROM (
        SELECT
            *,
            count(*) over(partition by TIV_2015) as cnt_1,
            count(*) over(partition by LAT, LON) as cnt_2
        FROM insurance
    ) a
WHERE a.cnt_1 > 1 AND a.cnt_2 < 2
```

# 586. Customer Placing the Largest Number of Orders

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'.
```

***Follow up:*** *What if more than one customer have the largest number of orders, can you find all the customer_number in this case?*

```
select customer_number

from orders

group by customer_number

order by count(*) desc

limit 0, 1
```

# 595. Big Countries

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 |

```sql
select name, population, area

from World

where area > 3000000 or population > 25000000
```

# 596. Classes More Than 5 Students

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       |
+---------+------------+
```

Should output:

```
+---------+
| class   |
+---------+
| Math    |
+---------+
```

**Note:**
The students should not be counted duplicate in each course.

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

# 597. Friend Requests I: Overall Acceptance Rate

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.

**Follow-up:**

- Can you write a query to return the accept rate but for every month?
- How about the cumulative accept rate for every day?

```
select
    round(
        ifnull(
            (select count(*) from (select distinct requester_id, accepter_id from request_accepted) as A)
            / (select count(*) from (select distinct sender_id, send_to_id from friend_request) as B)
        , 0)
    , 2) as accept_rate;
```

# 601. Human Traffic of Stadium★★

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.

```sql
select t.*
from stadium t
left join stadium p1 on t.id - 1 = p1.id
left join stadium p2 on t.id - 2 = p2.id
left join stadium n1 on t.id + 1 = n1.id
left join stadium n2 on t.id + 2 = n2.id
where  (t.people >= 100 and p1.people >= 100 and p2.people >= 100)
    or (t.people >= 100 and n1.people >= 100 and n2.people >= 100)
    or (t.people >= 100 and n1.people >= 100 and p1.people >= 100)
order by id;
```

```sql
select s1.*
from stadium as s1
join stadium as s2 on s2.people >= 100
join stadium as s3 on s3.people >= 100
where s1.people >= 100
      and ((s1.id + 1 = s2.id and s1.id + 2 = s3.id)
        or (s1.id - 1 = s2.id and s1.id + 1 = s3.id)
        or (s1.id - 2 = s2.id and s1.id - 1 = s3.id))
group by s1.id
order by s1.id
```

```sql
with t1 as (
                select id, visit_date, people,
                       id-rank() over(order by id) rk
                from stadium
                where people >= 100
            )

select id, visit_date, people
from t1
where rk in (
                select rk
                from t1
                group by rk
                having count(*) >= 3
            );
```

# 602. Friend Requests II: Who Has the Most Friends

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.
```

**Follow-up:**
In the real world, multiple people could have the same most number of friends, can you find all these people in this case?

```sql
select id, count(*) num
from (
        (
            select requester_id id
            from request_accepted
        )
        union all
        (
            select accepter_id id
            from request_accepted
        )
    ) t3
group by id
order by num desc
limit 1
```

# 603. Consecutive Available Seats

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.

```sql
select distinct(c1.seat_id)

from cinema c1

join cinema c2 on abs(c2.seat_id-c1.seat_id) = 1

where c1.free = 1 and c2.free = 1

order by c1.seat_id
```

# 607. Sales Person

**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`.

```sql
select name
from salesperson
where sales_id not in (
                        select sales_id
                        from orders a
                        join company b on a.com_id = b.com_id
                        where b.name = 'RED'
                    )
```

# 608. Tree Node

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.

```sql
select id, case
               when p_id is null then 'Root'
               when id in (select p_id from tree)then 'Inner'
               else 'Leaf'
           end as Type
from tree
```

# 610. Triangle Judgement

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      |
```

```
select *, IF(x+y > z and x+z > y and y+z > x, 'Yes', 'No') 'triangle'
from triangle
```

# 612. Shortest Distance in a Plane

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.

```
select round(min(sqrt(pow(a.x-b.x, 2)
              + pow(a.y-b.y, 2))), 2) as 'shortest'
from point_2d a
join point_2d b on !(a.x = b.x && a.y = b.y)
```

## 613. Shortest Distance in a Line

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`.

**Follow-up:** What if all these points have an id and are arranged from the left most to the right most of x axis?

```
select min(abs(a.x-b.x)) as 'shortest'
from point a
join point b on a.x != b.x
```

# 614. Second Degree Follower

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.

```sql
select followee as 'follower', count(distinct follower) 'num'
from follow
where followee in (
                        select distinct follower
                        from follow
                  )
group by followee
order by follower
```

# 615. Average Salary: Departments VS Company

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.

```sql
select distinct pay_month, department_id,  case
                                                when d_avg > c_avg then "higher"
                                                when d_avg = c_avg then "same"
                                                else "lower"
                                            end as comparison
from (
        select date_format(pay_date, "%Y-%m") as pay_month, department_id,
                avg(amount)over(partition by date_format(pay_date, "%Y-%m"),department_id) as d_avg,
                avg(amount)over(partition by date_format(pay_date, "%Y-%m")) as c_avg
        from salary
        join employee on salary.employee_id = employee.employee_id
    ) t
```

```sql
select date_format(pay_date, "%Y-%m") pay_month, department_id, case
                                                    when abs(avg(amount) - avg_m) < 1e-3 then 'same'
                                                    when avg(amount) < avg_m then 'lower'
                                                    else 'higher'
                                                end as comparison
from salary a
join employee b on a.employee_id = b.employee_id
join (
        select date_format(pay_date, "%Y-%m") pay_month, avg(amount) avg_m
        from salary
        group by date_format(pay_date, "%Y-%m")
    ) t on t.pay_month = date_format(pay_date, "%Y-%m")
group by date_format(pay_date, "%Y-%m"), department_id
```

# 618. Students Report By Geography★★★★

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 | | |

**Follow-up:** If it is unknown which continent has the most students, can you write a query to generate the student report?

```sql
#聚合函数 遍历
select
    max(case when continent = 'America' then name else null end) America,
    min(case when continent = 'Asia' then name else null end) Asia,
    max(case when continent = 'Europe' then name else null end) Europe
from (
        select name, continent,
            row_number()over(partition by continent order by name) cur_rank
        from student
     ) t
group by cur_rank
```

```sql
select America, Asia, Europe
from (
        select row_number() over(order by name) id, name as America
        from student
        where continent = 'America'
     ) a
left join (
            select row_number() over(order by name) id, name as Asia
            from student
            where continent = 'Asia'
          ) b on a.id = b.id
left join (
            select row_number() over(order by name) id, name as Europe
            from student
            where continent = 'Europe'
          ) c on a.id = c.id
```

# 619. Biggest Single Number

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**.

```sql
select (
            select num
            from my_numbers
            group by num
            having count(num) = 1
            order by num desc
            limit 1
        )  as num
```

# 620. Not Boring Movies

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     |
+---------+-----------+-------------+-----------+
```

```sql
select *

from cinema

where mod(id ,2) = 1 and description <> 'boring'

order by rating desc
```

# 626. Exchange Seats

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  |
+---------+---------+
```

**Note:**
If the number of students is odd, there is no need to change the last one's seat.

```sql
select
    if(id < (select count(*) from seat), if(mod(id, 2) = 0, id-1, id+1)
                 , if(mod(id, 2) = 0, id-1, id)) as id, student
from seat
order by id asc;
```

```sql
select
    (case
        when mod(id, 2) != 0 and counts != id then id + 1
        when mod(id, 2) != 0 and counts = id then id
        else id - 1
     end) AS id, student
from seat, (select count(*) as counts from seat) as _
order by id asc;
```

# 627. Swap Salary

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 |

```sql
update salary
set sex = if(sex = 'f', 'm', 'f');
```

```sql
update salary
set sex = case sex
               when 'm' THEN 'f'
               else 'm'
          end
```

# 1045. Customers Who Bought All Products

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.

```sql
select customer_id
from Customer
group by customer_id
having count(distinct product_key) = (select count(*) from Product)
```

# 1050. Actors and Directors Who Cooperated At Least Three Times

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.
```

```sql
select actor_id, director_id
from ActorDirector
group by actor_id, director_id
having count(*) >= 3
```

# 1068. Product Sales Analysis I

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 |

```sql
select product_name, year, price
from Sales a
join Product b on a.product_id = b.product_id
```

# 1069. Product Sales Analysis II

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 |

```
select product_id, sum(quantity) as total_quantity

from Sales

group by product_id
```

# 1070. Product Sales Analysis III

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  |

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

```sql
select  product_id, year as first_year, quantity, price
from Sales
where (product_id, year) in (
                                select product_id, min(year)
                                from Sales
                                group by product_id
                            )
```

# 1075. Project Employees I

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
```

```sql
select project_id, round(avg(experience_years), 2) as average_years
from Project a
join Employee b on a.employee_id = b.employee_id
group by a.project_id
```

# 1076. Project Employees II

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.

```sql
select project_id
from project
group by project_id
having count(*) >= all(select count(*) over(partition by project_id) from project);
```

# 1077. Project Employees III

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.

```sql
select a.project_id, a.employee_id
from Project a
join Employee b on a.employee_id = b.employee_id
where (a.project_id, b.experience_years) in (
                                                select a.project_id, max(experience_years)
                                                from Project a
                                                join Employee b on a.employee_id = b.employee_id
                                                group by a.project_id
                                            )
```

```sql
SELECT project_id, employee_id
FROM (
        SELECT p.project_id, p.employee_id,
                RANK() OVER(PARTITION BY p.project_id ORDER BY e.experience_years DESC) as 'num'
        FROM Project p
        JOIN Employee e ON p.employee_id = e.employee_id
    ) t
WHERE num = 1
```

# 1082. Sales Analysis I

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.
```

```sql
select seller_id
from sales
group by seller_id
having sum(price) >= all(select sum(price) over(partition by seller_id) from sales)
```

# 1083. Sales Analysis II

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.

```
select s.buyer_id
from product p
join sales s
where p.product_id = s.product_id
group by s.buyer_id
having sum(p.product_name = 'S8') > 0 and sum(p.product_name = 'iphone') < 1
```

```
select distinct buyer_id
from Sales
where buyer_id in
                (
                    select buyer_id
                    from Sales a
                    join Product b
                     on a.product_id = b.product_id and product_name = "S8"
                )
     and buyer_id not in
                (
                    select buyer_id
                    from Sales a
                    join Product b
                     on a.product_id = b.product_id and product_name = "iPhone"
                )
```

# 1084. Sales Analysis III

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.
```

```
select a.product_id, product_name
from Sales a
join Product b on a.product_id = b.product_id
group by product_id
having max(sale_date) <= '2019-03-31' and min(sale_date) >= '2019-01-01'
```

# 1097. Game Play Analysis V

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

```sql
select a1.install_dt,
       count(*) installs,
       round(count(a2.event_date)/count(*),2) Day1_retention
from (
        select player_id, min(event_date) install_dt
        from Activity
        group by player_id
     ) a1
left join Activity a2 on a1.player_id = a2.player_id
                and datediff(a2.event_date, a1.install_dt) = 1
group by a1.install_dt
```

# 1098. Unpopular Books

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" |
+-----------+--------------------+
```

```sql
select a.book_id, a.name
from books a
left join orders b on a.book_id = b.book_id
where available_from < '2019-05-23'
group by a.book_id
having ifnull(sum(if(dispatch_date < '2018-06-23', 0, quantity)), 0) < 10
order by a.book_id
```

# 1107. New Users Daily Count

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.
```

```sql
select t.d login_date, count(t.user_id) user_count
from (
    select user_id, min(activity_date) as d
    from Traffic
    where activity = "login"
    group by user_id
    having datediff('2019-06-30', d) <= 90
) t
group by t.d
```

# 1112. Highest Grade For Each Student

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    |
+------------+----------+-------+
```

```sql
select student_id, course_id, grade
from (
        select *, row_number() over(partition by student_id order by grade desc, course_id) as n
        from Enrollments
    ) as a
where n = 1;
```

```sql
select student_id, min(course_id) course_id, grade
from Enrollments
where (student_id, grade) in (
                                    select student_id, max(grade)
                                    from Enrollments
                                    group by student_id
                                )
group by student_id, grade
order by student_id
```

# 1113. Reported Posts

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.

```sql
select extra report_reason, count(distinct post_id) report_count
from Actions
where action_date = '2019-07-04'
       and extra is not null and action = "report"
group by extra
```

# 1126. Active Businesses

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.

```sql
select business_id
from Events a
join (
        select event_type, avg(occurences) as avg_o
        from Events
        group by event_type
    ) b on a.event_type = b.event_type and a.occurences > b.avg_o
group by business_id
having count(*) > 1
```

# 1127. User Purchase Platform★

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.

```sql
select t2.*, ifnull(sum(amount), 0) total_amount, ifnull(count(user_id), 0) total_u
sers
from (
        select distinct spend_date, "desktop" as platform from Spending
        union
        select distinct spend_date, "mobile" as platform from Spending
        union
        select distinct spend_date, "both" as platform from Spending
     ) t2
left join (
             select spend_date, sum(amount) amount, user_id,
                   case when count(*) = 1 then platform else "both" end as platform
             from Spending
             group by spend_date, user_id
          ) t1 on t1.spend_date = t2.spend_date and t1.platform = t2.platform
group by t2.spend_date, t2.platform
```

# 1132. Reported Posts II

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.

```sql
select round(avg(a)*100, 2)  average_daily_percent
from (
        select (count(distinct b.post_id)/count(distinct a.post_id)) a
        from actions a
        left join removals b on a.post_id = b.post_id
        where extra = 'spam'
        group by action_date
    ) v
```

# 1141. User Activity for the Past 30 Days I

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.
```

```sql
select activity_date day, count(distinct user_id) active_users
from Activity
where datediff('2019-07-27', activity_date) < 30
group by activity_date
```

# 1142. User Activity for the Past 30 Days II

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.

```sql
select round(ifnull(count(distinct user_id, session_id)
           / count(distinct user_id), 0), 2) average_sessions_per_user
from Activity
where datediff('2019-07-27', activity_date) < 30
```

# 1148. Article Views I

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    |
+------+
```

```
select distinct author_id as id
from Views
where author_id = viewer_id
order by author_id
```

# 1149. Article Views II

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    |
+------+
```

```sql
select distinct viewer_id id
from Views
group by viewer_id, view_date
having count(distinct article_id) > 1
order by viewer_id asc
```

# 1158. Market Analysis I

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              |
+-----------+------------+----------------+
```

```sql
select a.user_id buyer_id, join_date, count(seller_id) as orders_in_2019
from Users a
left join Orders b
on a.user_id = b.buyer_id and b.order_date between '2019-01-01' and '2019-12-31'
group by a.user_id
```

# 1159. Market Analysis II★

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.

```sql
select user_id seller_id,
        IF(item_brand = favorite_brand, 'yes', 'no') 2nd_item_fav_brand
from Users a
left join (
              select *, rank() over (partition by seller_id order by order_date) rk
              from Orders
          ) b on a.user_id = b.seller_id and rk = 2
left join Items c on b.item_id = c.item_id
group by user_id, favorite_brand, item_brand
```

# 1164. Product Price at a Given Date

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    |

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

```sql
select distinct a.product_id, ifnull(b.new_price,10) as price
from Products a
left join (
                select *, row_number() over(partition by product_id order by change_date desc)as rk
                from Products
                where change_date <= '2019-08-16'
          ) b on a.product_id = b.product_id and rk = 1
```

# 1173. Immediate Food Delivery I

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.

```
select round(sum(order_date = customer_pref_delivery_date)
                / count(*)*100, 2) immediate_percentage
from Delivery
```

# 1174. Immediate Food Delivery II

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.
```

```sql
select round(sum(order_date = customer_pref_delivery_date)
           / count(distinct customer_id)*100, 2) immediate_percentage
from Delivery
where (customer_id, order_date) in
                                 (
                                    select customer_id, min(order_date)
                                    from Delivery
                                    group by customer_id
                                 )
```

# 1179. Reformat Department Table★★★

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).

#不加 sum/max/min，只会去组的第一个，而加上聚合函数会遍历每一个

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

# 1193. Monthly Transactions I★

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 |

#sum 的用法：  可以访问同一行的两个不同列的值 ！！

```
select date_format(trans_date, "%Y-%m") month, country, count(*) trans_count,
     sum(state = 'approved') approved_count, sum(amount) trans_total_amount,
     sum(case when state = 'approved' then amount else 0 end) approved_total_amount
from Transactions
group by month, country
```

# 1194. Tournament Winners

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         |

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

#在 group 前可以先排序好， group by 之后不会影响原先的顺序， 是稳定分组？

```sql
select group_id, player_id
from (
    select players.*, sum(if(player_id = first_player, first_score, second_score)) score
    from players
    join matches on player_id = first_player or player_id = second_player
    group by player_id, group_id
    order by score desc, player_id
) tmp
group by group_id
```

```sql
select group_id, player_id
from (
        select group_id, player_id,
              rank() over (partition by group_id order by score desc, player_id asc) as rnk
        from Players a
        join (
                select player, sum(score) score
                from (
                    select first_player player, first_score score
                    from Matches
                    union  all
                    select second_player player, second_score score
                    from Matches
                ) t
                group by player
            ) a on player_id = player
     ) b
where rnk = 1
```

# 1204. Last Person to Fit in the Elevator

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.

```sql
select person_name
from (
        select person_name, turn,
               sum(weight) over(order by turn asc) as sum_w
        from Queue
     ) as t
where sum_w <= 1000
order by turn desc
limit 0, 1
```

```sql
select a.person_name
from Queue a
join Queue b on a.turn >= b.turn
group by a.person_id
having sum(b.weight) <= 1000
order by sum(b.weight) desc
limit 0, 1
```

# 1205. Monthly Transactions II

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 |

```sql
select month, country,
        sum(case when tag=0 then 1 else 0 end) as approved_count,
        sum(case when tag=0 then amount else 0 end) as approved_amount,
        sum(case when tag=1 then 1 else 0 end) as chargeback_count,
        sum(case when tag=1 then amount else 0 end) as chargeback_amount
from (
        select date_format(trans_date,'%Y-%m') month, country, amount, 0 tag
        from Transactions
        where state = 'approved'

        union all

        select date_format(a.trans_date,'%Y-%m') month, country, amount, 1 tag
        from Chargebacks a
        left join Transactions b on a.trans_id = b.id
     ) as t
 group by month, country
```

# 1211. Queries Quality and Percentage

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
```

```sql
select query_name, round(avg(rating / position), 2) quality,
    round(sum(rating < 3) / count(*)*100, 2) poor_query_percentage
from Queries
group by query_name
```

# 1212. Team Scores in Football Tournament

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 |

```sql
select team_id, team_name, ifnull(sum(point), 0) num_points
from Teams
left join (
                select host_team id, case
                                            when host_goals = guest_goals then 1
                                            when host_goals > guest_goals then 3
                                            else 0
                                    end as 'point'
                from Matches

                union all

                select guest_team id, case
                                            when host_goals = guest_goals then 1
                                            when host_goals > guest_goals then 0
                                            else 3
                                    end as 'point'
                from Matches
            ) b on id = team_id
group by team_id
order by num_points desc, team_id asc
```

# 1225. Report Contiguous Dates★★★

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   |
+--------------+--------------+--------------+
```

```sql
SELECT  CASE
            WHEN tag = 0 THEN 'failed'
            ELSE 'succeeded'
        END as period_state,
        MIN(date) as start_date,
        MAX(date) as end_date
FROM (
        SELECT *,
                @group := IF(@prev = tag, @group, @group+1) group_id,
                @prev := tag
        FROM (
                SELECT fail_date as date, 0 as tag
                FROM Failed
                UNION
                SELECT success_date as date, 1 as tag
                FROM Succeeded
             ) a
        JOIN (SELECT @group := -1, @prev := -1) b
        WHERE date LIKE '2019%'
        ORDER BY date ASC
    ) t
GROUP BY group_id
ORDER BY start_date
```

# 1241. Number of Comments per Post

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.

```sql
select a.sub_id post_id, count(distinct b.sub_id) number_of_comments
from (
        select distinct sub_id
        from Submissions
        where parent_id is null
     ) a
left join Submissions b on a.sub_id = b.parent_id
group by a.sub_id
```

# 1251. Average Selling Price

+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
```

```
select a.product_id, round(sum(units*price)/sum(units), 2)average_price
from UnitsSold a
join Prices b on a.product_id = b.product_id
               and a.purchase_date between start_date and end_date
group by a.product_id
```

# 1264. Page Recommendations

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.

```sql
select distinct page_id recommended_page
from Likes
where user_id in (
                    select user2_id from Friendship where user1_id = 1
                    union
                    select user1_id from Friendship where user2_id = 1
                 )
     and page_id not in (
                            select page_id
                            from Likes
                            where user_id = 1
                        )
```

# 1270. All People Report to the Given Manager

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.

```sql
select a.employee_id
from Employees a
left join Employees b on a.manager_id = b.employee_id
left join Employees c on b.manager_id = c.employee_id
left join Employees d on c.manager_id = d.employee_id
where d.employee_id = 1 and a.employee_id <> 1
```

# 1280. Students and Examinations

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.

```sql
select a.student_id, student_name, b.subject_name,
       count(c.student_id) attended_exams
from Students a
join Subjects b
left join Examinations c on a.student_id = c.student_id
                          and b.subject_name = c.subject_name
group by a.student_id, a.student_name, b.subject_name
order by a.student_id, student_name desc
```

# 1285. Find the Start and End Number of Continuous Ranges★

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.

```sql
SELECT min(log_id) start_id, max(log_id) end_id
FROM (
        SELECT log_id, CASE
                            WHEN @id = log_id - 1 THEN @num := @num
                            ELSE @num := @num + 1
                       END num
                       , @id := log_id
        FROM LOGS
        JOIN (SELECT @num := 0, @id := NULL) a
     ) x
GROUP BY num
```

```sql
SELECT MIN(log_id) start_id, MAX(log_id) end_id
FROM (
         SELECT
            log_id, log_id - row_number() OVER(ORDER BY log_id) as num
        FROM Logs
     ) t
GROUP BY num
```

# 1294. Weather Type in Each Country

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.
```

```sql
select a.country_name, case
                         when avg(b.weather_state) <= 15 then 'Cold'
                         when avg(b.weather_state) >= 25 then 'Hot'
                         else 'Warm'
                       end as weather_type
from Countries a
join Weather b on a.country_id = b.country_id and b.day like '2019-11%'
group by a.country_name
```

# 1303. Find the Team Size

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.

```sql
select employee_id, count(*) over(partition by team_id) team_size
from employee
```

# 1308. Running Total for Different Genders

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.

```sql
select gender, day,
    sum(score_points) over(partition by gender order by day) as total
from Scores
order by gender, day
```

# 1321. Restaurant Growth

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

```sql
select a.visited_on, sum(b.amount) amount,
       round(sum(b.amount)/7, 2) average_amount
from (
          select distinct visited_on
          from Customer
          where visited_on >= (select min(visited_on) from Customer) + 6
      ) as a
join Customer b on datediff(a.visited_on , b.visited_on)between 0 and 6
group by a.visited_on
```

```sql
select distinct visited_on, sum_amount as amount,
        round(average_amount, 2) as average_amount
from (
        select visited_on,
            sum(amount) over(order by visited_on rows 6 preceding) as sum_amount,
            avg(amount) over(order by visited_on rows 6 preceding) as average_amount
        from (
                select visited_on, sum(amount) as amount
                from Customer
                group by visited_on
             ) t1
    ) t2
where datediff(visited_on, (select min(visited_on) from Customer)) >= 6
```

# 1322. Ads Performance

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:

$$CTR = \begin{cases} 0, & \text{if Ad total clicks + Ad total views} = 0 \\ \frac{\text{Ad total clicks}}{\text{Ad total clicks + Ad total views}} \times 100, & \text{otherwise} \end{cases}$$

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

```
select ad_id, round(ifnull(sum(action = 'Clicked')
    / (sum(action = 'Clicked') + sum(action = 'Viewed'))*100, 0), 2) ctr
from Ads
group by ad_id
order by ctr desc, ad_id
```

# 1327. List the Products Ordered in a Period

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.

```sql
select product_name, sum(unit) unit
from Products a
join Orders b
on a.product_id = b.product_id and order_date like '2020-02%'
group by a.product_id
having sum(unit) >= 100
```

# 1336. Number of Transactions per Visit ● ●

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.
```

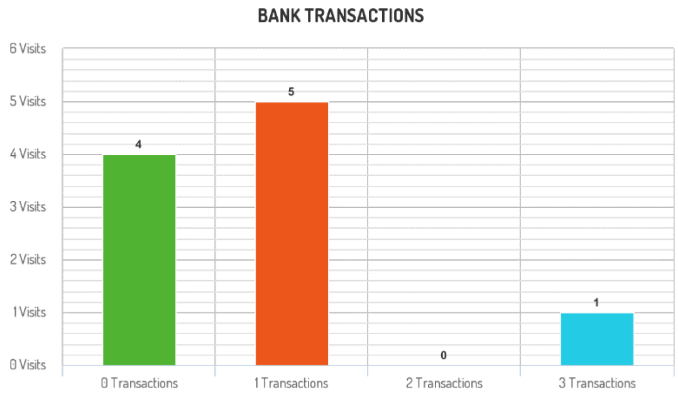
* For transactions_count = 1, The visits (2, "2020-01-03"), (7, "2020-01-11"), (8, "2020-01-28"), (1, "2020-01-02") and (1, "2020-01-04") did one transaction so visits_count = 5.

* 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

The chart drawn for this example is as follows:



```sql
select ceil(idx) transactions_count, ifnull(visits_count, 0) visits_count
from (
        select 0 idx

        union all

        select @i := @i + 1
        from transactions
        join (select @i := 0) val
        where @i < (
            select count(*) transactions_count
            from transactions
            group by user_id, transaction_date
            order by transactions_count desc
            limit 1
        )
    ) tmp1
left join (
             select transactions_count, count(*) visits_count
             from (
                 select count(t.user_id) transactions_count
                 from visits v left join transactions t
                 on v.user_id = t.user_id and visit_date = transaction_date
                 group by v.user_id, visit_date
              ) tmp
              group by transactions_count
          ) tmp2 on idx = transactions_count
```

```sql
with recursive t(n) as (
                          select 0
                          union all
                          select n+1
                          from t where n < (
                                select max(transaction_count)
                                from (
                                      select v.user_id, v.visit_date,
                                              count(tr.amount) transaction_count
                                      from visits v
                                      left join transactions tr
                                          on v.user_id=tr.user_id
                                              and v.visit_date=tr.transaction_date
                                      group by v.user_id,v.visit_date
                                   ) a
                           )
                        ),
tmp as(
        select v.user_id, v.visit_date, count(t.amount) transaction_count
        from visits v
        left join transactions t on v.user_id = t.user_id
                                    and v.visit_date=t.transaction_date
        group by v.user_id,v.visit_date
      )

select n transactions_count, ifnull(visit_count,0) visits_count
from t
left join (
             select transaction_count, count(*) visit_count from tmp
             group by transaction_count
          ) b on t.n = b.transaction_count
```

# 1341. Movie Rating

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 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.

The query is returned in 2 rows, the query result format is in the following 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 Monica 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.

```sql
(
    select name results
    from Movie_Rating a
    join Users b on a.user_id = b.user_id
    group by a.user_id, name
    order by count(*) desc, name
    limit 0, 1
)
union
(
    select title results
    from Movie_Rating a
    join Movies b on a.movie_id = b.movie_id
    where created_at like '2020-02%'
    group by a.movie_id, title
    order by avg(rating) desc, title
    limit 0, 1
)
```

# 1350. Students With Invalid Departments

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.

```sql
select Students.id, Students.name
from Students
left join Departments on department_id = Departments.id
where Departments.id is null
```

# 1355. Activity Participants

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.)

```sql
SELECT activity
FROM Friends
GROUP BY activity
HAVING COUNT(*) > SOME(SELECT COUNT(*) FROM Friends GROUP BY activity)
    and COUNT(*) < SOME(SELECT COUNT(*) FROM Friends GROUP BY activity)
```

# 1364. Number of Trusted Contacts of a Customer

Table: `Customers`

```
+---------------+---------+
| Column Name   | Type    |
+---------------+---------+
| customer_id   | int     |
| customer_name | varchar |
| email         | varchar |
+---------------+---------+
customer_id is the primary key for this table.
Each row of this table contains the name and the email of a customer of an online shop.
```

Table: `Contacts`

```
+---------------+---------+
| Column Name   | Type    |
+---------------+---------+
| user_id       | id      |
| contact_name  | varchar |
| contact_email | varchar |
+---------------+---------+
(user_id, contact_email) is the primary key for this table.
Each row of this table contains the name and email of one contact of customer with user_id.
This table contains information about people each customer trust. The contact may or may not exist in the Customers table.
```

Table: `Invoices`

```
+-------------+---------+
| Column Name | Type    |
+-------------+---------+
| invoice_id  | int     |
| price       | int     |
| user_id     | int     |
+-------------+---------+
invoice_id is the primary key for this table.
Each row of this table indicates that user_id has an invoice with invoice_id and a price.
```

Write an SQL query to find the following for each `invoice_id`:

- `customer_name`: The name of the customer the invoice is related to.
- `price`: The price of the invoice.
- `contacts_cnt`: The number of contacts related to the customer.
- `trusted_contacts_cnt`: The number of contacts related to the customer and at the same time they are customers to the shop. (i.e His/Her email exists in the Customers table.)

Order the result table by `invoice_id`.

The query result format is in the following example:

```
Customers table:
+-------------+---------------+--------------------+
| customer_id | customer_name | email              |
+-------------+---------------+--------------------+
| 1           | Alice         | alice@leetcode.com |
| 2           | Bob           | bob@leetcode.com   |
```

```
| 13          | John         | john@leetcode.com  |
| 6           | Alex         | alex@leetcode.com  |
+-------------+--------------+--------------------+
Contacts table:
+-------------+-------------+--------------------+
| user_id     | contact_name | contact_email      |
+-------------+-------------+--------------------+
| 1           | Bob         | bob@leetcode.com   |
| 1           | John        | john@leetcode.com  |
| 1           | Jal         | jal@leetcode.com   |
| 2           | Omar        | omar@leetcode.com  |
| 2           | Meir        | meir@leetcode.com  |
| 6           | Alice       | alice@leetcode.com |
+-------------+-------------+--------------------+
Invoices table:
+------------+-------+---------+
| invoice_id | price | user_id |
+------------+-------+---------+
| 77         | 100   | 1       |
| 88         | 200   | 1       |
| 99         | 300   | 2       |
| 66         | 400   | 2       |
| 55         | 500   | 13      |
| 44         | 60    | 6       |
+------------+-------+---------+
```

Result table:

| invoice_id | customer_name | price | contacts_cnt | trusted_contacts_cnt |
|---|---|---|---|---|
| 44 | Alex | 60 | 1 | 1 |
| 55 | John | 500 | 0 | 0 |
| 66 | Bob | 400 | 2 | 0 |
| 77 | Alice | 100 | 3 | 2 |
| 88 | Alice | 200 | 3 | 2 |
| 99 | Bob | 300 | 2 | 0 |

Alice has three contacts, two of them are trusted contacts (Bob and John).

Bob has two contacts, none of them is a trusted contact.

Alex has one contact and it is a trusted contact (Alice).

John doesn't have any contacts.

```
select invoice_id, customer_name, price,
        count(c.contact_name) contacts_cnt,
       ifnull(sum(c.contact_name in (select customer_name from Customers))
              , 0) as trusted_contacts_cnt
from Invoices a
join Customers b on a.user_id = customer_id
left join Contacts c on a.user_id = c.user_id
group by invoice_id, customer_name, price
order by invoice_id
```

# 1369. Get the Second Most Recent Activity

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.

```sql
select username, activity, startDate, endDate
from (
        select *,rank() over (partition by username order by startDate desc) as rnk
                ,count(*) over (partition by username) as cnt
        from UserActivity
    ) t
where cnt = 1 or rnk = 2
```

# 1378. Replace Employee ID With The Unique Identifier

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.
```

```sql
select unique_id, name
from Employees a
left join EmployeeUNI b on a.id = b.id
```

# 1384. Total Sales Amount by Year●●

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.

```
select t.product_id, product_name, report_year, sum(total_amount) total_amount
from (
        select product_id, "2020" report_year,
              (datediff(if(period_end < "2021-01-01", period_end, date("2020-12-31")),
               if(period_start > "2020-01-01", period_start, date("2020-01-01"))) + 1)
                                                     * average_daily_sales total_amount
        from Sales
        having total_amount > 0

        union all

        select product_id, "2019" report_year,
              (datediff(if(period_end < "2020-01-01", period_end, date("2019-12-31")),
               if(period_start > "2019-01-01", period_start, date("2019-01-01"))) + 1)
                                                 * average_daily_sales total_amount
        from Sales
        having total_amount > 0

        union all

        select product_id, "2018" report_year,
              (datediff(if(period_end<"2019-01-01",period_end,date("2018-12-31")),
              if(period_start > "2018-01-01", period_start, date("2018-01-01"))) + 1)
                                                 * average_daily_sales total_amount
        from Sales
        having total_amount > 0
     ) t
left join product p on p.product_id = t.product_id
group by product_id, report_year
order by product_id, report_year
```

```
select s.PRODUCT_ID, PRODUCT_NAME, date_format(bound, '%Y') REPORT_YEAR,
        (datediff(
            if (bound < period_end, bound, period_end),
            if (makedate(year(bound), 1) > period_start, makedate(year(bound), 1),
              period_start)
         ) + 1) * average_daily_sales TOTAL_AMOUNT
from product p
join (
        select '2018-12-31' bound
        union all
        select '2019-12-31' bound
        union all
        select '2020-12-31' bound
     ) bounds
join sales s
on p.product_id = s.product_id and year(bound) between year(period_start)
                                                   and year(period_end)
order by s.product_id, report_year
```

# 1393. Capital Gain/Loss

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$. Capital gain/loss is the sum of capital gains/losses for each ('Buy' --> 'Sell') operation = (1010 - 10) + (500 - 1000) + (10000 - 1000) = 1000 - 500 + 9000 = 9500$.
```

```sql
select stock_name, sum(IF(operation = 'Buy',
                -price, price)) capital_gain_loss
from Stocks
group by stock_name
```

# 1398. Customers Who Bought Products A and B but Not C

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.

```sql
select a.customer_id, customer_name
from Orders a
join Customers b on a.customer_id = b.customer_id
group by a.customer_id
having sum(product_name = 'A') > 0
      and sum(product_name = 'B') > 0
      and sum(product_name = 'C') = 0
order by a.customer_id
```

# 1407. Top Travellers

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.

```sql
select name, ifnull(sum(distance), 0) travelled_distance
from Users a
left join Rides b on a.id = b.user_id
group by a.id
order by travelled_distance desc, name
```

## 1412. Find the Quiet Students in All Exams★★

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.

```sql
select a.student_id, s.student_name
from (
       select student_id,
           rank() over (partition by exam_id order by score) r1,
           rank() over (partition by exam_id order by score desc) r2
       from Exam
    ) a
join Student s on a.student_id = s.student_id
group by a.student_id
having min(r1) > 1 and min(r2) > 1
order by a.student_id
```

# 1421. NPV Queries

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.
```

```sql
select a.id, a.year, ifnull(npv, 0) as npv
from Queries a
left join NPV b on a.id = b.id and a.year = b.year
```

# 1435. Create a Session Bar Chart

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.

```
select '[0-5>' BIN,
        sum(if(duration < 300, 1, 0)) TOTAL from Sessions
union
select '[5-10>' bin,
        sum(if(300 <= duration and duration<600, 1, 0)) total from Sessions
union
select '[10-15>' bin,
        sum(if(600 <= duration and duration<900, 1, 0)) total from Session
union
select '15 or more' bin,
        sum(if(900 <= duration, 1, 0)) total from Sessions
```

# 1440. Evaluate Boolean Expression

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.

```sql
select Expressions.*,
       case operator
            when '>' then IF(a.value > b.value, 'true', 'false')
            when '<' then IF(a.value < b.value, 'true', 'false')
            else IF(a.value = b.value, 'true', 'false')
        end as value
from Expressions
join Variables a on left_operand = a.name
join Variables b on right_operand = b.name
```

# 1445. Apples & Oranges

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).
```

```sql
select sale_date,
       sum(IF(fruit = 'apples', sold_num, -sold_num)) diff
from Sales
group by sale_date
```

# 1454. Active Users★

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.
```

**Follow up question:**
Can you write a general solution if the active users are those who logged in to their accounts for `n` or more consecutive days?

```sql
with tbl as
    (
       SELECT id, login_date,
             dense_rank() over(partition by id order by login_date) rnk
       FROM Logins
     )

select distinct a.id, a.name
from tbl
JOIN Accounts a ON tbl.id = a.id
GROUP BY a.id, date_add(login_date, interval - rnk day)
HAVING count(distinct login_date) >= 5
```

```sql
select distinct L1.id, name
from Logins as L1
JOIN Logins as L2 on L1.id = L2.id
          and Datediff(L1.login_date, L2.login_date) BETWEEN 0 and 4
join Accounts on Accounts.id = L1.id
group by L1.id, L1.login_date
having count(distinct L2.login_date) = 5
```

# 1459. Rectangles Area

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.

```sql
select a.id p1, b.id p2,
       abs(a.x_value-b.x_value)*abs(a.y_value-b.y_value) area
from Points a
join Points b on a.id < b.id
              and a.x_value <> b.x_value
              and a.y_value <> b.y_value
order by area desc, p1, p2
```

# 1468. Calculate Salaries★

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.

```sql
select company_id, employee_id, employee_name,
       round((case
                 when max(salary) over (partition by company_id) < 1000 then 1
                 when max(salary) over (partition by company_id) <= 10000 then 0.76
                 else 0.51
              end) * salary,0) as 'salary'
from Salaries
```

```sql
select company_id, employee_id, employee_name,
        case
             when max_salary < 1000 then salary
             when max_salary > 10000 then round(salary*0.51,0)
             else round(salary*0.76,0)
        end as salary
from (
         select *, max(salary) over(partition by company_id) max_salary
         from Salaries
      ) t
```

# 1479. Sales by Day of the Week★★

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.

```sql
select item_category Category,
        sum(if(date_format(order_date,'%W')='Monday',quantity,0)) as Monday,
        sum(if(date_format(order_date,'%W')='Tuesday',quantity,0)) as Tuesday,
        sum(if(date_format(order_date,'%W')='Wednesday',quantity,0)) as Wednesday,
        sum(if(date_format(order_date,'%W')='Thursday',quantity,0)) as Thursday,
        sum(if(date_format(order_date,'%W')='Friday',quantity,0)) as Friday,
        sum(if(date_format(order_date,'%W')='Saturday',quantity,0)) as Saturday,
        sum(if(date_format(order_date,'%W')='Sunday',quantity,0)) as Sunday
from Items a
left join Orders b on a.item_id = b.item_id
group by item_category
order by item_category
```

# 1485. Group Sold Products By The Date★

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 (Masks), we just return it.

```sql
#group_concat 连接多个字符串， 字符串连接时可以排序， 自定义分隔符

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

## 1495. Friendly Movies Streamed Last Month

Table: `TVProgram`

```
+---------------+---------+
| Column Name   | Type    |
+---------------+---------+
| program_date  | date    |
| content_id    | int     |
| channel       | varchar |
+---------------+---------+
(program_date, content_id) is the primary key for this table.
This table contains information of the programs on the TV.
content_id is the id of the program in some channel on the TV.
```

Table: `Content`

```
+------------------+---------+
| Column Name      | Type    |
+------------------+---------+
| content_id       | varchar |
| title            | varchar |
| Kids_content     | enum    |
| content_type     | varchar |
+------------------+---------+
content_id is the primary key for this table.
Kids_content is an enum that takes one of the values ('Y', 'N') where:
'Y' means is content for kids otherwise 'N' is not content for kids.
```

```
content_type is the category of the content as movies, series, etc.
```

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.
```

```sql
select distinct title
from TVProgram a
join Content b on a.content_id = b.content_id
               and Kids_content = 'Y' and content_type = 'Movies'
where program_date like "2020-06%"
```

# 1501. Countries You Can Safely Invest In

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 company 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.
```

```sql
select c2.name as country
from Calls c1
join Person p on id = caller_id or id = callee_id
join Country c2 on country_code = left(phone_number, 3)
group by c2.name
having avg(duration) > (select avg(duration) from Calls)
```

# 1511. Customer Order Frequency

Table: `Customers`

```
+---------------+---------+
| Column Name   | Type    |
+---------------+---------+
| customer_id   | int     |
| name          | varchar |
| country       | varchar |
+---------------+---------+
customer_id is the primary key for this table.
This table contains information of the customers in the company.
```

Table: `Product`

```
+---------------+---------+
| Column Name   | Type    |
+---------------+---------+
| product_id    | int     |
| description   | varchar |
| price         | int     |
+---------------+---------+
product_id is the primary key for this table.
This table contains information of the products in the company.
price is the product cost.
```

Table: `Orders`

```
+---------------+---------+
| Column Name   | Type    |
+---------------+---------+
| order_id      | int     |
| customer_id   | int     |
| product_id    | int     |
| order_date    | date    |
| quantity      | int     |
+---------------+---------+
order_id is the primary key for this table.
This table contains information on customer orders.
customer_id is the id of the customer who bought "quantity" products with
id "product_id".
Order_date is the date in format ('YYYY-MM-DD') when the order was shipped.
```

Write an SQL query to report the customer_id and customer_name of customers who have spent at least $100 in each month of June and July 2020.

Return the result table in any order.

The query result format is in the following example.

```
Customers
+--------------+-----------+-------------+
| customer_id  | name      | country     |
+--------------+-----------+-------------+
| 1            | Winston   | USA         |
| 2            | Jonathan  | Peru        |
```

```
| 3            | Moustafa   | Egypt      |
+--------------+------------+------------+
```

Product

```
+--------------+------------+------------+
| product_id   | description | price     |
+--------------+------------+------------+
| 10           | LC Phone    | 300       |
| 20           | LC T-Shirt  | 10        |
| 30           | LC Book     | 45        |
| 40           | LC Keychain | 2         |
+--------------+------------+------------+
```

Orders

```
+--------------+-------------+-------------+-------------+-----------+
| order_id     | customer_id | product_id  | order_date  | quantity  |
+--------------+-------------+-------------+-------------+-----------+
| 1            | 1           | 10          | 2020-06-10  | 1         |
| 2            | 1           | 20          | 2020-07-01  | 1         |
| 3            | 1           | 30          | 2020-07-08  | 2         |
| 4            | 2           | 10          | 2020-06-15  | 2         |
| 5            | 2           | 40          | 2020-07-01  | 10        |
| 6            | 3           | 20          | 2020-06-24  | 2         |
| 7            | 3           | 30          | 2020-06-25  | 2         |
| 9            | 3           | 30          | 2020-05-08  | 3         |
```

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

```
Result table:

+--------------+------------+

| customer_id  | name       |

+--------------+------------+

| 1            | Winston    |

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

Winston spent $300 (300 * 1) in June and $100 ( 10 * 1 + 45 * 2) in July 2020.

Jonathan spent $600 (300 * 2) in June and $20 ( 2 * 10) in July 2020.

Moustafa spent $110 (10 * 2 + 45 * 2) in June and $0 in July 2020.

```sql
select a.customer_id, name
from Customers a
join Orders b on a.customer_id = b.customer_id
join Product c on b.product_id = c.product_id
       and (order_date like '2020-06%' or order_date like '2020-07%')
group by a.customer_id, name
having sum(IF(order_date like '2020-06%', quantity*price, 0)) >= 100
        and sum(IF(order_date like '2020-07%',
               quantity*price, 0)) >= 100
```

# 1517. Find Users With Valid E-Mails★

Table: `Users`

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

| Column Name   | Type    |

+---------------+---------+

| user_id       | int     |

| name          | varchar |

| mail          | varchar |

+---------------+---------+

user_id is the primary key for this table.

This table contains information of the users signed up in a website. Some
e-mails are invalid.
```

Write an SQL query to find the users who have **valid emails**.

A valid e-mail has a prefix name and a domain where:

- **The prefix name** is a string that may contain letters (upper or lower case), digits, underscore `'_'`, period `'.'` and/or dash `'-'`. The prefix name **must** start with a letter.
- **The domain** is `'@leetcode.com'`.

Return the result table in any order.

The query result format is in the following example.

```
Users

+---------+-----------+-------------------------+

| user_id | name      | mail                    |

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

```
| 1       | Winston   | winston@leetcode.com    |
| 2       | Jonathan  | jonathanisgreat         |
| 3       | Annabelle | bella-@leetcode.com     |
| 4       | Sally     | sally.come@leetcode.com |
| 5       | Marwan    | quarz#2020@leetcode.com |
| 6       | David     | david69@gmail.com       |
| 7       | Shapiro   | .shapo@leetcode.com     |
+---------+-----------+-------------------------+

Result table:
+---------+-----------+-------------------------+
| user_id | name      | mail                    |
+---------+-----------+-------------------------+
| 1       | Winston   | winston@leetcode.com    |
| 3       | Annabelle | bella-@leetcode.com     |
| 4       | Sally     | sally.come@leetcode.com |
+---------+-----------+-------------------------+
The mail of user 2 doesn't have a domain.
The mail of user 5 has # sign which is not allowed.
The mail of user 6 doesn't have leetcode domain.
The mail of user 7 starts with a period.
```

```sql
SELECT *
FROM Users
WHERE mail REGEXP '^[A-Za-z][A-Za-z0-9\_\.\-]*@leetcode\.com$'
```

# 1527. Patients With a Condition

Table: `Patients`

```
+--------------+---------+
| Column Name  | Type    |
+--------------+---------+
| patient_id   | int     |
| patient_name | varchar |
| conditions   | varchar |
+--------------+---------+
patient_id is the primary key for this table.
'conditions' contains 0 or more code separated by spaces.
This table contains information of the patients in the hospital.
```

Write an SQL query to report the patient_id, patient_name all conditions of patients who have Type I Diabetes. Type I Diabetes always starts with `DIAB1` prefix

Return the result table in any order.

The query result format is in the following example.

```
Patients
+------------+--------------+--------------+
| patient_id | patient_name | conditions   |
+------------+--------------+--------------+
| 1          | Daniel       | YFEV COUGH   |
| 2          | Alice        |              |
| 3          | Bob          | DIAB100 MYOP |
```

```
| 4          | George       | ACNE DIAB100 |
| 5          | Alain        | DIAB201      |
+------------+--------------+--------------+
```

```
Result table:
+------------+--------------+--------------+
| patient_id | patient_name | conditions   |
+------------+--------------+--------------+
| 3          | Bob          | DIAB100 MYOP |
| 4          | George       | ACNE DIAB100 |
+------------+--------------+--------------+
```

Bob and George both have a condition that starts with DIAB1.

```sql
select *
from Patients
where conditions like '%DIAB1%'
```

```sql
select *
from Patients
where conditions regexp 'DIAB1'
```

# 1532. The Most Recent Three Orders

Table: `Customers`

```
+---------------+---------+
| Column Name   | Type    |
+---------------+---------+
| customer_id   | int     |
| name          | varchar |
+---------------+---------+
customer_id is the primary key for this table.
This table contains information about customers.
```

Table: `Orders`

```
+---------------+---------+
| Column Name   | Type    |
+---------------+---------+
| order_id      | int     |
| order_date    | date    |
| customer_id   | int     |
| cost          | int     |
+---------------+---------+
order_id is the primary key for this table.
This table contains information about the orders made by customer_id.
Each customer has one order per day.
```

Write an SQL query to find the most recent 3 orders of each user. If a user ordered less than 3 orders return all of their orders.

Return the result table sorted by `customer_name` in **ascending** order and in case of a tie by the `customer_id` in **ascending** order. If there still a tie, order them by the `order_date` in **descending** order.

The query result format is in the following example:

```
Customers

+-------------+-----------+

| customer_id | name      |

+-------------+-----------+

| 1           | Winston   |

| 2           | Jonathan  |

| 3           | Annabelle |

| 4           | Marwan    |

| 5           | Khaled    |

+-------------+-----------+



Orders

+----------+------------+-------------+------+

| order_id | order_date | customer_id | cost |

+----------+------------+-------------+------+

| 1        | 2020-07-31 | 1           | 30   |

| 2        | 2020-07-30 | 2           | 40   |

| 3        | 2020-07-31 | 3           | 70   |

| 4        | 2020-07-29 | 4           | 100  |

| 5        | 2020-06-10 | 1           | 1010 |

| 6        | 2020-08-01 | 2           | 102  |
```

| | | | |
|---|---|---|---|
| 7 | 2020-08-01 | 3 | 111 |
| 8 | 2020-08-03 | 1 | 99 |
| 9 | 2020-08-07 | 2 | 32 |
| 10 | 2020-07-15 | 1 | 2 |

Result table:

| customer_name | customer_id | order_id | order_date |
|---|---|---|---|
| Annabelle | 3 | 7 | 2020-08-01 |
| Annabelle | 3 | 3 | 2020-07-31 |
| Jonathan | 2 | 9 | 2020-08-07 |
| Jonathan | 2 | 6 | 2020-08-01 |
| Jonathan | 2 | 2 | 2020-07-30 |
| Marwan | 4 | 4 | 2020-07-29 |
| Winston | 1 | 8 | 2020-08-03 |
| Winston | 1 | 1 | 2020-07-31 |
| Winston | 1 | 10 | 2020-07-15 |

Winston has 4 orders, we discard the order of "2020-06-10" because it is the oldest order.

Annabelle has only 2 orders, we return them.

Jonathan has exactly 3 orders.

Marwan ordered only one time.

We sort the result table by customer_name in ascending order, by customer_id in ascending order and by order_date in descending order in case of a tie.

**Follow-up:**
Can you write a general solution for the most recent `n` orders?

```
select name customer_name, a.customer_id, order_id, order_date
from Customers a
join (
        select *, dense_rank() over (partition by customer_id  order by order_date desc) rnk
        from Orders
     ) b on a.customer_id = b.customer_id and rnk <= 3
order by name, a.customer_id, order_date desc
```

# 1543. Fix Product Name Format

Table: `Sales`

```
+--------------+---------+
| Column Name  | Type    |
+--------------+---------+
| sale_id      | int     |
| product_name | varchar |
| sale_date    | date    |
+--------------+---------+
sale_id is the primary key for this table.
Each row of this table contains the product name and the date it was sold.
```

Since table Sales was filled manually in the year 2000, `product_name` may contain leading and/or trailing white spaces, also they are case-insensitive.

Write an SQL query to report

- `product_name` in lowercase without leading or trailing white spaces.
- `sale_date` in the format `('YYYY-MM')`
- `total` the number of times the product was sold in this month.

Return the result table ordered by `product_name` in **ascending order**, in case of a tie order it by `sale_date` in **ascending order**.

The query result format is in the following example.

```
Sales
+------------+------------------+--------------+
| sale_id    | product_name     | sale_date    |
+------------+------------------+--------------+
```

```
| 1          |      LCPHONE     | 2000-01-16   |
| 2          |    LCPhone       | 2000-01-17   |
| 3          |     LcPhOnE      | 2000-02-18   |
| 4          |      LCKeyCHAiN  | 2000-02-19   |
| 5          |   LCKeyChain     | 2000-02-28   |
| 6          | Matryoshka       | 2000-03-31   |
+------------+-----------------+--------------+
```

Result table:

```
+--------------+-------------+----------+
| product_name | sale_date   | total    |
+--------------+-------------+----------+
| lcphone      | 2000-01     | 2        |
| lckeychain   | 2000-02     | 2        |
| lcphone      | 2000-02     | 1        |
| matryoshka   | 2000-03     | 1        |
+--------------+-------------+----------+
```

In January, 2 LcPhones were sold, please note that the product names are not case sensitive and may contain spaces.

In Februery, 2 LCKeychains and 1 LCPhone were sold.

In March, 1 matryoshka was sold.

```sql
select lower(trim(product_name)) product_name,
       DATE_FORMAT(sale_date, '%Y-%m') sale_date, count(*) total
from Sales
group by lower(trim(product_name)), DATE_FORMAT(sale_date, '%Y-%m')
order by product_name asc, sale_date asc
```

# 1549. The Most Recent Orders for Each Product

Table: `Customers`

```
+---------------+---------+
| Column Name   | Type    |
+---------------+---------+
| customer_id   | int     |
| name          | varchar |
+---------------+---------+
customer_id is the primary key for this table.
This table contains information about the customers.
```

Table: `Orders`

```
+---------------+---------+
| Column Name   | Type    |
+---------------+---------+
| order_id      | int     |
| order_date    | date    |
| customer_id   | int     |
| product_id    | int     |
+---------------+---------+
order_id is the primary key for this table.
This table contains information about the orders made by customer_id.
There will be no product ordered by the same user more than once in one day.
```

Table: `Products`

```
+---------------+---------+
| Column Name   | Type    |
+---------------+---------+
| product_id    | int     |
| product_name  | varchar |
| price         | int     |
+---------------+---------+
product_id is the primary key for this table.
This table contains information about the Products.
```

Write an SQL query to find the most recent order(s) of each product.

Return the result table sorted by `product_name` in **ascending** order and in case of a tie by the `product_id` in **ascending** order. If there still a tie, order them by the `order_id` in **ascending** order.

The query result format is in the following example:

```
Customers
+-------------+-----------+
| customer_id | name      |
| 1           | Winston   |
| 2           | Jonathan  |
| 3           | Annabelle |
| 4           | Marwan    |
| 5           | Khaled    |
+-------------+-----------+
```

Orders

| order_id | order_date | customer_id | product_id |
| --- | --- | --- | --- |
| 1 | 2020-07-31 | 1 | 1 |
| 2 | 2020-07-30 | 2 | 2 |
| 3 | 2020-08-29 | 3 | 3 |
| 4 | 2020-07-29 | 4 | 1 |
| 5 | 2020-06-10 | 1 | 2 |
| 6 | 2020-08-01 | 2 | 1 |
| 7 | 2020-08-01 | 3 | 1 |
| 8 | 2020-08-03 | 1 | 2 |
| 9 | 2020-08-07 | 2 | 3 |
| 10 | 2020-07-15 | 1 | 2 |

Products

| product_id | product_name | price |
| --- | --- | --- |
| 1 | keyboard | 120 |
| 2 | mouse | 80 |
| 3 | screen | 600 |
| 4 | hard disk | 450 |

Result table:

```
+--------------+------------+----------+------------+
| product_name | product_id | order_id | order_date |
| keyboard     | 1          | 6        | 2020-08-01 |
| keyboard     | 1          | 7        | 2020-08-01 |
| mouse        | 2          | 8        | 2020-08-03 |
| screen       | 3          | 3        | 2020-08-29 |
+--------------+------------+----------+------------+
```

keyboard's most recent order is in 2020-08-01, it was ordered two times this day.

mouse's most recent order is in 2020-08-03, it was ordered only once this day.

screen's most recent order is in 2020-08-29, it was ordered only once this day.

The hard disk was never ordered and we don't include it in the result table.

```
select product_name, a.product_id, order_id, order_date
from Products a
join (
         select *,
             rank() over (partition by product_id order by order_date desc) rnk
         from Orders
     ) b on a.product_id = b.product_id and rnk = 1
order by product_name, a.product_id, order_id
```

# 1555. Bank Account Summary

Table: `Users`

```
+--------------+---------+
| Column Name  | Type    |
+--------------+---------+
| user_id      | int     |
| user_name    | varchar |
| credit       | int     |
+--------------+---------+
user_id is the primary key for this table.
Each row of this table contains the current credit information for each user.
```

Table: `Transactions`

```
+---------------+---------+
| Column Name   | Type    |
+---------------+---------+
| trans_id      | int     |
| paid_by       | int     |
| paid_to       | int     |
| amount        | int     |
| transacted_on | date    |
+---------------+---------+
trans_id is the primary key for this table.
Each row of this table contains the information about the transaction in the bank.
```

```
User with id (paid_by) transfer money to user with id (paid_to).
```

Leetcode Bank (LCB) helps its coders in making virtual payments. Our bank records all transactions in the table *Transaction*, we want to find out the current balance of all users and check wheter they have breached their credit limit (If their current credit is less than 0).

Write an SQL query to report.

- `user_id`
- `user_name`
- `credit`, current balance after performing transactions.
- `credit_limit_breached`, check credit_limit ("Yes" or "No")

Return the result table in **any** order.

The query result format is in the following example.

```
Users table:

+------------+-------------+-------------+

| user_id    | user_name    | credit      |

+------------+-------------+-------------+

| 1          | Moustafa     | 100         |

| 2          | Jonathan     | 200         |

| 3          | Winston      | 10000       |

| 4          | Luis         | 800         |

+------------+-------------+-------------+


Transactions table:

+------------+------------+------------+----------+---------------+

| trans_id   | paid_by    | paid_to    | amount   | transacted_on |

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

```
| 1          | 1          | 3          | 400      | 2020-08-01    |

| 2          | 3          | 2          | 500      | 2020-08-02    |

| 3          | 2          | 1          | 200      | 2020-08-03    |

+------------+------------+------------+----------+---------------+


Result table:

+------------+------------+------------+-----------------------+

| user_id    | user_name  | credit     | credit_limit_breached |

+------------+------------+------------+-----------------------+

| 1          | Moustafa   | -100       | Yes                   |

| 2          | Jonathan   | 500        | No                    |

| 3          | Winston    | 9900       | No                    |

| 4          | Luis       | 800        | No                    |

+------------+------------+------------+-----------------------+

Moustafa paid $400 on "2020-08-01" and received $200 on "2020-08-03",
credit (100 -400 +200) = -$100

Jonathan received $500 on "2020-08-02" and paid $200 on "2020-08-08",
credit (200 +500 -200) = $500

Winston received $400 on "2020-08-01" and paid $500 on "2020-08-03", credit
(10000 +400 -500) = $9990

Luis didn't received any transfer, credit = $800
```

```sql
select user_id, user_name,
       credit + IFNULL(sum(IF(paid_by=user_id, -amount, amount)), 0) credit,
       IF(credit + IFNULL(sum(IF(paid_by=user_id, -amount, amount)),
                          0) < 0, 'Yes', 'No') credit_limit_breached
from Users
left join Transactions b on user_id = paid_by or user_id = paid_to
group by user_id, user_name
```

# 1565. Unique Orders and Customers Per Month

Table: `Orders`

```
+---------------+---------+
| Column Name   | Type    |
+---------------+---------+
| order_id      | int     |
| order_date    | date    |
| customer_id   | int     |
| invoice       | int     |
+---------------+---------+
order_id is the primary key for this table.
This table contains information about the orders made by customer_id.
```

Write an SQL query to find the number of **unique orders** and the number of **unique customers** with invoices **> $20** for each **different month**.

Return the result table sorted in **any order**.

The query result format is in the following example:

```
Orders
+----------+------------+-------------+------------+
| order_id | order_date | customer_id | invoice    |
+----------+------------+-------------+------------+
| 1        | 2020-09-15 | 1           | 30         |
| 2        | 2020-09-17 | 2           | 90         |
| 3        | 2020-10-06 | 3           | 20         |
| 4        | 2020-10-20 | 3           | 21         |
```

| | | | |
|---|---|---|---|
| 5 | 2020-11-10 | 1 | 10 |
| 6 | 2020-11-21 | 2 | 15 |
| 7 | 2020-12-01 | 4 | 55 |
| 8 | 2020-12-03 | 4 | 77 |
| 9 | 2021-01-07 | 3 | 31 |
| 10 | 2021-01-15 | 2 | 20 |

Result table:

| month | order_count | customer_count |
|---|---|---|
| 2020-09 | 2 | 2 |
| 2020-10 | 1 | 1 |
| 2020-12 | 2 | 1 |
| 2021-01 | 1 | 1 |

In September 2020 we have two orders from 2 different customers with invoices > $20.

In October 2020 we have two orders from 1 customer, and only one of the two orders has invoice > $20.

In November 2020 we have two orders from 2 different customers but invoices < $20, so we don't include that month.

In December 2020 we have two orders from 1 customer both with invoices > $20.

In January 2021 we have two orders from 2 different customers, but only one of them with invoice > $20.

```sql
select DATE_FORMAT(order_date, "%Y-%m") month,
      count(*) order_count,
      count(distinct customer_id) customer_count
from Orders
where invoice > 20
group by month
```

# 1571. Warehouse Manager

Table: `Warehouse`

```
+--------------+---------+
| Column Name  | Type    |
+--------------+---------+
| name         | varchar |
| product_id   | int     |
| units        | int     |
+--------------+---------+
(name, product_id) is the primary key for this table.
Each row of this table contains the information of the products in each warehouse.
```

Table: `Products`

```
+---------------+---------+
| Column Name   | Type    |
+---------------+---------+
| product_id    | int     |
| product_name  | varchar |
| Width         | int     |
| Length        | int     |
| Height        | int     |
+---------------+---------+
product_id is the primary key for this table.
Each row of this table contains the information about the product dimensions (Width, Lenght and Height) in feets of each product.
```

Write an SQL query to report, How much cubic feet of **volume** does the inventory occupy in each warehouse.

- warehouse_name
- volume

Return the result table in **any** order.

The query result format is in the following example.

```
Warehouse table:

+------------+-------------+------------+

| name       | product_id  | units      |

+------------+-------------+------------+

| LCHouse1   | 1           | 1          |

| LCHouse1   | 2           | 10         |

| LCHouse1   | 3           | 5          |

| LCHouse2   | 1           | 2          |

| LCHouse2   | 2           | 2          |

| LCHouse3   | 4           | 1          |

+------------+-------------+------------+


Products table:

+------------+-------------+------------+----------+-----------+

| product_id | product_name | Width      | Length   | Height    |

+------------+-------------+------------+----------+-----------+

| 1          | LC-TV        | 5          | 50       | 40        |

| 2          | LC-KeyChain  | 5          | 5        | 5         |
```

```
| 3          | LC-Phone     | 2          | 10        | 10         |

| 4          | LC-T-Shirt   | 4          | 10        | 20         |

+------------+--------------+------------+----------+-----------+


Result table:

+----------------+------------+

| warehouse_name | volume     |

+----------------+------------+

| LCHouse1       | 12250      |

| LCHouse2       | 20250      |

| LCHouse3       | 800        |

+----------------+------------+

Volume of product_id = 1 (LC-TV), 5x50x40 = 10000

Volume of product_id = 2 (LC-KeyChain), 5x5x5 = 125

Volume of product_id = 3 (LC-Phone), 2x10x10 = 200

Volume of product_id = 4 (LC-T-Shirt), 4x10x20 = 800

LCHouse1: 1 unit of LC-TV + 10 units of LC-KeyChain + 5 units of LC-Phone.

          Total volume: 1*10000 + 10*125  + 5*200 = 12250 cubic feet

LCHouse2: 2 units of LC-TV + 2 units of LC-KeyChain.

          Total volume: 2*10000 + 2*125 = 20250 cubic feet

LCHouse3: 1 unit of LC-T-Shirt.

          Total volume: 1*800 = 800 cubic feet.
```

```sql
select name warehouse_name, sum(units*Width*Length*Height) as volume
from Warehouse a
join Products b on a.product_id = b.product_id
group by name
```