

Problem 3617: Find Students with Study Spiral Pattern

Problem Information

Difficulty: Hard

Acceptance Rate: 25.34%

Paid Only: No

Problem Description

Table: `students`

+-----+-----+ | Column Name | Type | +-----+-----+ | student_id | int || student_name | varchar | | major | varchar | +-----+-----+ student_id is the unique identifier for this table. Each row contains information about a student and their academic major.

Table: `study_sessions`

+-----+-----+ | Column Name | Type | +-----+-----+ | session_id | int || student_id | int | | subject | varchar | | session_date | date | | hours_studied | decimal | +-----+-----+ session_id is the unique identifier for this table. Each row represents a study session by a student for a specific subject.

Write a solution to find students who follow the **“Study Spiral Pattern”** \- students who consistently study multiple subjects in a rotating cycle.

* A Study Spiral Pattern means a student studies at least `3`**different subjects** in a repeating sequence
* The pattern must repeat for **at least** `2`**complete cycles** (minimum `6` study sessions)
* Sessions must be **consecutive dates** with no gaps longer than `2` days between sessions
* Calculate the **cycle length** (number of different subjects in the pattern)
* Calculate the **total study hours** across all sessions in the pattern
* Only include students with cycle length of **at least** `3`**subjects**

Return _the result table ordered by cycle length in**descending** order, then by total study hours in **descending** order_.

The result format is in the following example.

****Example:****

****Input:****

students table:

		student_id	student_name	major	
		1	Alice Chen	Computer Science	
		2	Bob Johnson	Mathematics	
		3	Carol Davis	Physics	
		4	David Wilson	Chemistry	
		5	Emma Brown	Biology	

study_sessions table:

		session_id	student_id	subject	
		session_date	hours_studied		
		2023-10-01	2.5	1	Math
		2023-10-02	3.0	1	Physics
		2023-10-03	2.0	1	Chemistry
		2023-10-04	2.5	1	Math
		2023-10-05	3.0	1	Physics
		2023-10-06	2.0	1	Chemistry
		2023-10-07	2.5	1	Math
		2023-10-08	3.0	1	Physics
		2023-10-09	2.0	1	Chemistry
		2023-10-10	2.5	1	Math
		2023-10-11	3.0	1	Physics
		2023-10-12	2.0	1	Chemistry
		2023-10-13	2.5	1	Math
		2023-10-14	3.0	1	Physics
		2023-10-15	2.0	1	Chemistry
		2023-10-16	2.5	1	Math
		2023-10-17	3.0	1	Physics
		2023-10-18	2.0	1	Chemistry
		2023-10-19	2.5	1	Math
		2023-10-20	3.0	1	Physics
		2023-10-21	2.0	1	Chemistry
		2023-10-22	2.5	1	Math
		2023-10-23	3.0	1	Physics
		2023-10-24	2.0	1	Chemistry
		2023-10-25	2.5	1	Math
		2023-10-26	3.0	1	Physics
		2023-10-27	2.0	1	Chemistry
		2023-10-28	2.5	1	Math
		2023-10-29	3.0	1	Physics
		2023-10-30	2.0	1	Chemistry
		2023-10-31	2.5	1	Math
		2023-11-01	3.0	1	Physics
		2023-11-02	2.0	1	Chemistry
		2023-11-03	2.5	1	Math
		2023-11-04	3.0	1	Physics
		2023-11-05	2.0	1	Chemistry
		2023-11-06	2.5	1	Math
		2023-11-07	3.0	1	Physics
		2023-11-08	2.0	1	Chemistry
		2023-11-09	2.5	1	Math
		2023-11-10	3.0	1	Physics
		2023-11-11	2.0	1	Chemistry
		2023-11-12	2.5	1	Math
		2023-11-13	3.0	1	Physics
		2023-11-14	2.0	1	Chemistry
		2023-11-15	2.5	1	Math
		2023-11-16	3.0	1	Physics
		2023-11-17	2.0	1	Chemistry
		2023-11-18	2.5	1	Math
		2023-11-19	3.0	1	Physics
		2023-11-20	2.0	1	Chemistry
		2023-11-21	2.5	1	Math
		2023-11-22	3.0	1	Physics
		2023-11-23	2.0	1	Chemistry
		2023-11-24	2.5	1	Math
		2023-11-25	3.0	1	Physics
		2023-11-26	2.0	1	Chemistry
		2023-11-27	2.5	1	Math
		2023-11-28	3.0	1	Physics
		2023-11-29	2.0	1	Chemistry
		2023-11-30	2.5	1	Math
		2023-12-01	3.0	1	Physics
		2023-12-02	2.0	1	Chemistry
		2023-12-03	2.5	1	Math
		2023-12-04	3.0	1	Physics
		2023-12-05	2.0	1	Chemistry
		2023-12-06	2.5	1	Math
		2023-12-07	3.0	1	Physics
		2023-12-08	2.0	1	Chemistry
		2023-12-09	2.5	1	Math
		2023-12-10	3.0	1	Physics
		2023-12-11	2.0	1	Chemistry
		2023-12-12	2.5	1	Math
		2023-12-13	3.0	1	Physics
		2023-12-14	2.0	1	Chemistry
		2023-12-15	2.5	1	Math
		2023-12-16	3.0	1	Physics
		2023-12-17	2.0	1	Chemistry
		2023-12-18	2.5	1	Math
		2023-12-19	3.0	1	Physics
		2023-12-20	2.0	1	Chemistry
		2023-12-21	2.5	1	Math
		2023-12-22	3.0	1	Physics
		2023-12-23	2.0	1	Chemistry
		2023-12-24	2.5	1	Math
		2023-12-25	3.0	1	Physics
		2023-12-26	2.0	1	Chemistry
		2023-12-27	2.5	1	Math
		2023-12-28	3.0	1	Physics
		2023-12-29	2.0	1	Chemistry
		2023-12-30	2.5	1	Math
		2023-12-31	3.0	1	Physics
		2023-01-01	2.0	1	Chemistry
		2023-01-02	2.5	1	Math
		2023-01-03	3.0	1	Physics
		2023-01-04	2.0	1	Chemistry
		2023-01-05	2.5	1	Math
		2023-01-06	3.0	1	Physics
		2023-01-07	2.0	1	Chemistry
		2023-01-08	2.5	1	Math
		2023-01-09	3.0	1	Physics
		2023-01-10	2.0	1	Chemistry
		2023-01-11	2.5	1	Math
		2023-01-12	3.0	1	Physics
		2023-01-13	2.0	1	Chemistry
		2023-01-14	2.5	1	Math
		2023-01-15	3.0	1	Physics
		2023-01-16	2.0	1	Chemistry
		2023-01-17	2.5	1	Math
		2023-01-18	3.0	1	Physics
		2023-01-19	2.0	1	Chemistry
		2023-01-20	2.5	1	Math
		2023-01-21	3.0	1	Physics
		2023-01-22	2.0	1	Chemistry
		2023-01-23	2.5	1	Math
		2023-01-24	3.0	1	Physics
		2023-01-25	2.0	1	Chemistry
		2023-01-26	2.5	1	Math
		2023-01-27	3.0	1	Physics
		2023-01-28	2.0	1	Chemistry
		2023-01-29	2.5	1	Math
		2023-01-30	3.0	1	Physics
		2023-01-31	2.0	1	Chemistry
		2023-02-01	2.5	1	Math
		2023-02-02	3.0	1	Physics
		2023-02-03	2.0	1	Chemistry
		2023-02-04	2.5	1	Math
		2023-02-05	3.0	1	Physics
		2023-02-06	2.0	1	Chemistry
		2023-02-07	2.5	1	Math
		2023-02-08	3.0	1	Physics
		2023-02-09	2.0	1	Chemistry
		2023-02-10	2.5	1	Math
		2023-02-11	3.0	1	Physics
		2023-02-12	2.0	1	Chemistry
		2023-02-13	2.5	1	Math
		2023-02-14	3.0	1	Physics
		2023-02-15	2.0	1	Chemistry
		2023-02-16	2.5	1	Math
		2023-02-17	3.0	1	Physics
		2023-02-18	2.0	1	Chemistry
		2023-02-19	2.5	1	Math
		2023-02-20	3.0	1	Physics
		2023-02-21	2.0	1	Chemistry
		2023-02-22	2.5	1	Math
		2023-02-23	3.0	1	Physics
		2023-02-24	2.0	1	Chemistry
		2023-02-25	2.5	1	Math
		2023-02-26	3.0	1	Physics
		2023-02-27	2.0	1	Chemistry
		2023-02-28	2.5	1	Math
		2023-02-29	3.0	1	Physics
		2023-02-30	2.0	1	Chemistry
		2023-02-31	2.5	1	Math
		2023-03-01	3.0	1	Physics
		2023-03-02	2.0	1	Chemistry
		2023-03-03	2.5	1	Math
		2023-03-04	3.0	1	Physics
		2023-03-05	2.0	1	Chemistry
		2023-03-06	2.5	1	Math
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		2023-03-29	2.0	1	Chemistry
		2023-03-30	2.5	1	Math
		2023-03-31	3.0	1	Physics
		2023-04-01	2.0	1	Chemistry
		2023-04-02	2.5	1	Math
		2023-04-03	3.0	1	Physics
		2023-04-04	2.0	1	Chemistry
		2023-04-05	2.5	1	Math
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		2023-05-02	2.5	1	Math
		2023-05-03	3.0	1	Physics
		2023-05-04	2.0	1	Chemistry
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		2023-05-06	3.0	1	Physics
		2023-05-07	2.0	1	Chemistry
		2023-05-08	2.5	1	Math
		2023-05-09	3.0	1	Physics
		2023-05-10	2.0	1	Chemistry
		2023-05-11	2.5	1	Math
		2023-05-12	3.0	1	Physics
		2023-05-13	2.0	1	Chemistry
		2023-05-14	2.5	1	Math</

* Total hours: $2.5 + 3.0 + 2.0 + 2.5 + 3.0 + 2.0 = 15.0$ hours * **Bob Johnson (student_id = 2):** * Study sequence: Algebra -> Calculus -> Statistics -> Geometry -> Algebra -> Calculus -> Statistics -> Geometry * Pattern: 4 subjects (Algebra, Calculus, Statistics, Geometry) repeating for 2 complete cycles * Consecutive dates: Oct 1-8 with no gaps > 2 days * Cycle length: 4 subjects * Total hours: $4.0 + 3.5 + 2.5 + 3.0 + 4.0 + 3.5 + 2.5 + 3.0 = 26.0$ hours * **Students not included:** * Carol Davis (student_id = 3): Only 2 subjects (Biology, Chemistry) - doesn't meet minimum 3 subjects requirement * David Wilson (student_id = 4): Only 2 study sessions with a 4-day gap - doesn't meet consecutive dates requirement * Emma Brown (student_id = 5): No study sessions recorded

The result table is ordered by cycle_length in descending order, then by total_study_hours in descending order.

Code Snippets

MySQL:

```
# Write your MySQL query statement below
```

MS SQL Server:

```
/* Write your T-SQL query statement below */
```

PostgreSQL:

```
-- Write your PostgreSQL query statement below
```