



## Assignment 9

Hand in this assignment until Friday, January 9<sup>th</sup> 2025, 12:00 pm at the latest.

### 💡 Running out of ideas?

Are you hitting a roadblock? Are some of the exercises unclear? Do you just need that one hint to get the ball rolling? Refer to the [#forum](#) channel on our Discord server—maybe you'll find just the help you need.

### 🎉 Happy Holidays!

The entire Advanced SQL team wishes you a very happy holiday season! We hope you enjoy this time and get some rest. Don't stress about this exercise sheet; you have until after the new year to complete it. 😊

### 💡 Note

We assume all the queries you write for this assignment most probably will utilize [window functions](#).

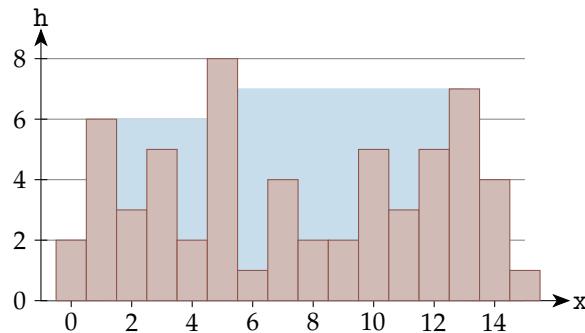
### \_exam-style Exercises

Exercises marked with [Exam-style Exercises](#) are similar in style to those you will find in the exam. You can use these to hone your expectations and gauge your skills.

## Task 1: Water Bars

[Window Functions](#)

You are given a table of bars specified by their position  $x$  and their height  $h$ .



```

1 CREATE TABLE bars (
2   x int,
3   h int
4 );
```

Write a SQL query that computes the amount of water the bar chart can hold as depicted above. The result of the SQL query is a table with exactly one integer: for the given example you should receive 35.

### 💡 Hint

Since, obviously, the heights of neighbouring bars are relevant here, consider to use [scan](#)-like window functions to tackle this task.

## Task 2: Bike Tour

[Window Functions](#)

We recorded a dataset of waypoints and elevation of a biking tour from Rottenburg to the WSI. The dataset is provided in table `tour` of file `tour.sql`. This file also contains a macro `distance` which calculates the earth distance between two waypoints in meter. A waypoint is defined through its latitude and longitude.

Write SQL queries to calculate the following:

- A For each waypoint  $w$ , calculate the distance from home (Rottenburg, the first data point) to  $w$  as the crow flies, i.e., the direct earth distance between home and the waypoint. The result lists the `id` of  $w$  and the `earth distance` between home and the waypoint  $w$ .
- B For each waypoint  $w$ , calculate the cycled (waypoint to waypoint) distance from home to  $w$ . The result lists the `id` of  $w$  and the `cycled distance` between home and the waypoint.
- C For each waypoint  $w$ , calculate the *estimated* grade of the slope at  $w$  from the height differences of the waypoints just before/after  $w$ . The result lists the `id` of  $w$  and `slope` in %.

### Task 3: Consecutive Logins

### WINDOW FUNCTIONS

We define a table `work` as follows:

```
1 CREATE TABLE  work (
2   emp_id integer,
3   login date
4 );
```

Each row  $(e, d)$  in table  `work` indicates that employee  $e$  was logged in on day  $d$ .

Write a SQL query that returns a table with schema `(emp_id, streak)`, where for each employee `(emp_id)`, `streak` is the maximum number of consecutive days that employee was logged in.

 work	
emp_id	login
2	'2016-04-06'
4	'2016-04-06'
2	'2016-04-06'
4	'2016-04-07'
2	'2016-04-07'
5	'2016-04-07'
2	'2016-04-10'
5	'2016-04-08'
2	'2016-04-11'
5	'2016-04-09'

#### Example

For the sample logins given in table  `work`, the query results in a table where the employees with  $id = 2$  and  $id = 4$  had, at most, 2 consecutive days of logins and the employee with  $id = 5$  had, at most, 3 consecutive days of logins.

emp_id	streak
2	2
4	2
5	3