## **Homework Assignment 2**

Maximum earnable: 70 pt. Due: 11:59PM April 10, 2025

• Read the assignment carefully. You will need to write and execute several SQL queries; and submit the results of your queries.

- You are allowed to re-use any of the queries from the lecture slides while developing solutions to the problems.
- This is an individual work; Please be clear with HGU CSEE Standard:
  - Submitting assignments or program codes written by others or acquired from the internet without explicit approval of the professor is regarded as cheating.
  - Showing or lending one's own homework to other student is also considered cheating that disturbs fair evaluation and hinders the academic achievement of the other student.
  - o It is regarded as cheating if two or more students conduct their homework together and submit it individually when the homework is not a group assignment.
- Use of ChatGPT or similar AI tools: Students are prohibited from using ChatGPT or similar AI platforms to directly obtain solutions for this assignment. The intent of the assignment is to exercise your understanding and application of the course material. Leveraging AI tools to bypass this learning process is considered a breach of academic integrity. Any evidence of such behavior will result in penalties.
- When finished, submit your work to *LMS*.

1. (1 pt. per blank) Fill in the blanks.

Read Cha	pters 3 of I	Database S	System (	Concepts	and answer	the follow	ving questions
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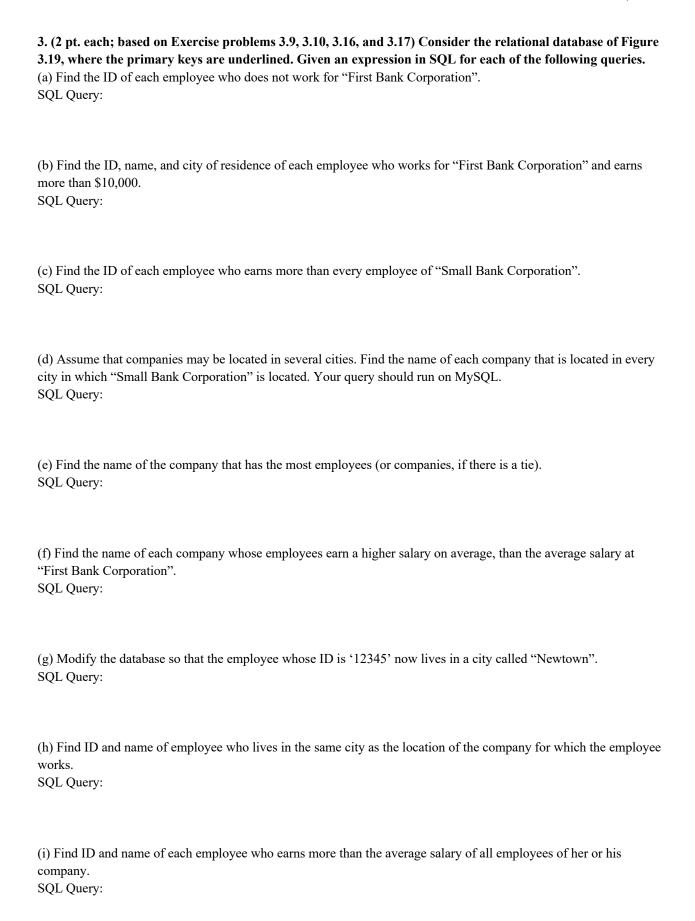
(a)	The (	) provides commands for defining relation schemas, deleting relations, and modifying relation				
	schemas.					
(b)	The (	) provides the ability to query information from the database and to insert tuples into, delete				
	tuples from, and	modify tuples in the database.				
(c)	The primary key	attributes are required to be ( ) and ( ).				
(d)	The (	) specifies that the values of attributes for any record in the relation must correspond to values				
	of the primary ke	by attributes of some tuple in another relation.				
(e)	Subqueries that r	return only one tuple containing a single attribute are called ( ).				
(f)	The (	) clause causes the records in the result of a query to appear in sorted order.				
(g)	The (	) clause provides a way of defining a temporary relation whose definition is available only to				
	the query in which	th the clause occurs.				
2. (	4 pt. each) Short-	answer questions.				
(a)	(Exercise problem	3.6) The SQL LIKE operator is case sensitive (in most systems), but the LOWER() function				

on strings can be used to perform case-insensitive matching. Show how to write a query that finds departments

(b) (Exercise problem 3.20) Show that, in SQL,  $\Leftrightarrow$  ALL is identical to NOT IN.

whose names contain the string "sci" as a substring, regardless of the case.

(c) (Exercise problem 3.19) List two reasons why null values might be introduced into the database.



- (j) Find the company that has the smallest payroll (sum of all salary in a company). SQL Query:
- (k) Given all employees of "First Bank Corporation" a 10 percent raise. SQL Query:
- (l) Delete all tuples in the works relation for employees of "Small Bank Corporation". SQL Query:
- 4. (3 pt. each) Find the answers to the following questions and provide the SQL queries showing how you find them. All queries should be complete to obtain the listed answers solely by themselves.
- (a) Write a query that **lists up all classes** that have been open in the university, together **with the number of students** who were in each class. More specifically, enumerate all the *course IDs*, *section IDs*, *years*, *and semesters*, along with the *number of students who took each of the classes*.

Hint: you may want to come up with a result that starts as below.

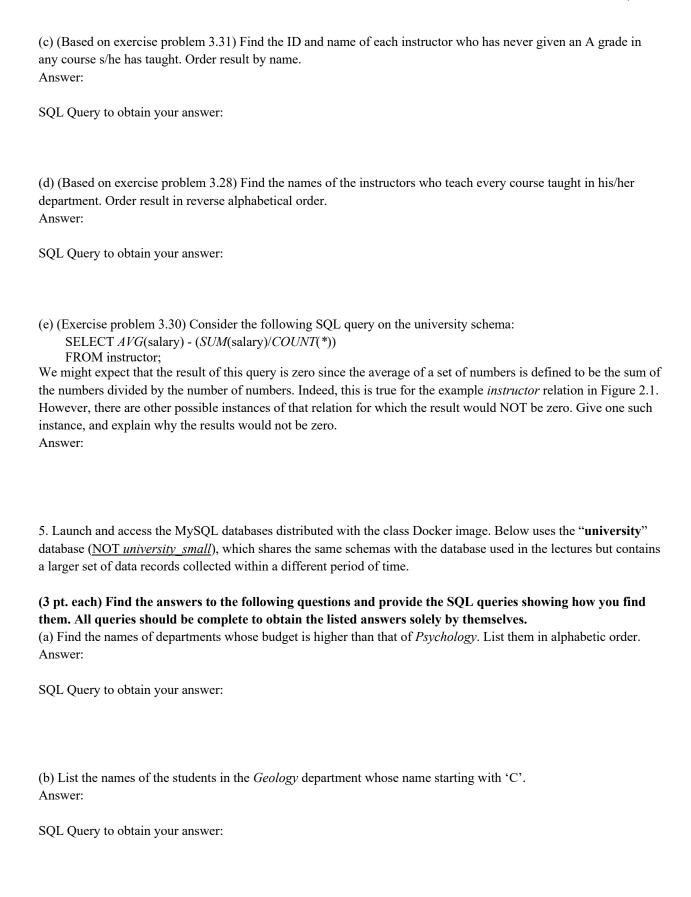
<pre>□ course_id</pre>	■ sec_id ÷	I≣ semester ‡	II year ≎	<pre>num_students ÷</pre>
105	1	Fall	2009	327
105	2	Fall	2002	307
137	1	Spring	2002	304
158	1	Fall	2008	291
158	2	Spring	2008	286
169	1	Spring	2007	300
169	2	Fall	2002	280
192	1	Fall	2002	338
200	1	Spring	2007	299
200	2	Fall	2002	292
237	1	Spring	2008	302

Query (you do not need to submit your query result):

(b) (Exercise problem 3.26) For each student who has retaken a course at least twice (*i.e.*, the student has taken the course at least three times), show the course ID and the student's ID. Please display your results in order of course ID and do not display duplicate rows.

Answer:

SQL Query to obtain your answer:



(c) Write a query that counts the **number of students for each department** and sort the results in **descending order of the student counts**. *Hint: the head of the query result looks like the following:* 

■ dept_name	<b>‡</b>	<pre>mum_students ;</pre>
Civil Eng.		120
Languages		119
History		117
Pol. Sci.		109
Comp. Sci.		108

Query (you do not need to submit your query result):

(d) (Exercise problem 3.22) Rewrite the WHERE clause WHERE UNIQUE (SELECT title FROM course) without using the UNIQUE construct.

Answer: