**Homework Assignment 1**

Due: 11:59PM March 24, 2023

1. Problem…Fill in the blanks

1. Data model
2. Table, column, name, row
3. Instance, database schema
4. Data-definition language (DDL), data-manipulation language (DML)
5. Query
6. Transaction manager
7. File manager
8. Buffer manager
9. Null value

2. Problem…What are the major disadvantages of keeping organizational information in a file-processing system

Data redundancy and inconsistency

Difficulty in accessing data

Data isolation

Integrity problems

Concurrent-access anomalies, Security problems, etc…

3. Problem…List four significant differences between a file-processing system and a DBMS

|  |  |  |
| --- | --- | --- |
|  | **File-processing system** | **DBMS** |
| 1 | data redundancy and inconsistency | Less or no data redundancy and inconsistency |
| 2 | accessing data is inefficient and inconvenient | Flexible to access data |
| 3 | Difficult to ensure atomicity | can handle Atomicity problems well |
| 4 | Less secure | Highly secure |

4. Problem… Consider the employee database of Figure 2.17 (page 60). Give an expression in the relational algebra to express each of the following queries:

1. )
2. )
3. )
4. )
5. )

5. Problem… Write the following queries in relational algebra, using the university schema (Figure 2.8, page 46)

1. )
2. )
4. )

6. Problem… 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.

1. List all **instructor** names in the accounting department.

Answer: Lembr, Moreira, Hau, Ullman

SQL Query to obtain your answer:

SELECT name FROM instructor WHERE dept\_name='accounting';

1. How many **students** are in the Statistics department?

Answer: 85

SQL Query to obtain your answer: SELECT COUNT(\*) FROM student WHERE dept\_name='Statistics';

1. How many **unique student names** are in the Astronomy department?

Answer: 104

SQL Query to obtain your answer: SELECT COUNT(DISTINCT name) FROM student WHERE dept\_name='Astronomy';

1. Find all students who have “**db**” as a substring in their name.

Answer: Goldbu, Sandberg

SQL Query to obtain your answer: SELECT DISTINCT name FROM student WHERE name LIKE '%db%';

7. Problem… List the names of all tables that the “**university**” database has

Answer: advisor, classroom, course, department, instructor, prereq, section, student, takes, teaches, time\_slot

SQL Query to obtain your answer: SHOW TABLES;

8. Problem… Execute and explain the differences among the results of the following queries

1. SELECT \* FROM instructor;

* This query shows all columns in the table ‘instructor’.

(ii) SELECT 'Teacher' FROM instructor;

* This query shows every data in table ‘instructor’ as string ‘Teacher’.

(iii) SELECT 'Teacher';

* This query shows the new column named ‘Teacher’ filled of string ‘Teacher’

(iv) SELECT \*, 'Teacher' FROM instructor;

* This query shows all columns and the new column named ‘Teacher’ filled of string ‘Teacher’ in the table ‘instructor’.