HW1 22000546 Yeeun Lee

1. Data redundancy and inconsistency, Difficulty in access data, Data isolation, Integrity problems, Atomicity problems, Concurrent-access anomalies, Security problems

2. a. data model
   b. tables, columns, name, row
   c. instance, database schema
   d. DDL, DML
   e. query
   f. transaction manager
   g. file manager
   h. buffer manager
   i. null value

3.

A file-processing system	DBMS
- The files may have different formats. This can lead to duplication.	- Data is stored in the same structure. This reduces the possibility of duplication.
- You can access same data simultaneously. This may lead to inconsistent data.	- It synchronizes data so that multiple users feel like they are accessing the database alone.
- It is difficult to retrieve the necessary data.	- It is easy to retrieve and access data through queries.
- It is difficult to satisfy the consistency constraints.	- DBMS automatically checks the constraints and ensures that data satisfies integrity.

4. a. $\Pi_{person\_name}(\sigma_{city = "Miami"}(employee))$

   b. $\Pi_{person\_name}(\sigma_{salary > 100000}(works))$

   c. $\Pi_{person\_name}(\sigma_{city = "Miami" \wedge salary > 100000}(employee \bowtie_{employee.person\_name = works.person\_name} works))$

   d. $\Pi_{ID, person\_name}(\sigma_{company\_name \neq "BigBank"}(employee \bowtie_{employee.person\_name = works.person\_name} works))$

   e. $\Pi_{ID, person\_name}(\sigma_{salary > MAX(salary)}(employee \bowtie_{employee.person\_name = works.person\_name} works))$

   f. $\Pi_{ID, person\_name, City}(\sigma_{company\_name = "BigBank"}(employee \bowtie_{employee.person\_name = works.person\_name} works))$

   g. $\Pi_{ID, person\_name, street, city}(\sigma_{company\_name = "BigBank" \wedge salary > 10000}(employee \bowtie_{employee.person\_name = works.person\_name} works))$

   h. $\Pi_{ID, person\_name}(employ \bowtie_{employ.city = company.city} company)$

5. a. $\Pi_{ID,name}(\sigma_{dept\_name="Physics"}(instructor))$.

b. $\Pi_{ID,name}(\sigma_{building="Watson"}(department \bowtie_{department.dept\_name = instructor.dept\_name} Instructor))$

c. $\Pi_{ID,name}(\sigma(takes \bowtie_{takes.course\_id = course.course\_id} Course)) -$
$\Pi_{ID,name}(\sigma_{dept\_name="Comp. Sci."}(takes \bowtie_{takes.course\_id = course.course\_id} Course))$

d. $\Pi_{ID,name}(\sigma(takes \bowtie_{takes.course\_id = course.course\_id} Course)) -$
$\Pi_{ID,name}(\sigma_{year \neq 2018}(takes \bowtie_{takes.course\_id = course.course\_id} Course))$

e. $\Pi_{ID,name}(\sigma_{year \neq 2018}(takes \bowtie_{takes.course\_id = course.course\_id} Course))$

6. a.

name
Lembr
Moreira
Hau
Ullman

```
select name from instructor where dept_name = "Accounting";
```

b.

count(*)
85

```
select count(*) from student where dept_name = "Statistics";
```

c.

count(distinct na...
104

```
select count(distinct name) from student where dept_name="Astronomy";
```

d.

ID	name	dept_name	tot_cred
2629	Goldbu	Languages	4
67560	Sandberg	Geology	63
74070	Sandberg	Mech. Eng.	119

```
select * from student where name like "%db%";
```

7.

ID	name	dept_name	tot_cred
2629	Goldbu	Languages	4
67560	Sandberg	Geology	63
74070	Sandberg	Mech. Eng.	119

```
show tables in university;
```

8. The result of (i) is a table with 4 columns and 50 rows. These are every records from instructor table.
The result of (ii) is a table with 1 columns and 50 rows with value 'teacher'.
This query makes a table that is all value is 'teacher', and the number of its row is same as the row of instructor table.
The result of (iii) is a table with 1 column and 1 row, and its value is 'teacher'.
The result of (iv) is a table with 5 columns and 50 rows.

select * from <table_name> : shows all records of <table_name>
select <literal> from <table_name> : shows a 1xN table, and each row has <literal> value
select <literal> : shows a 1x1 table, and its value is <literal>
select *, <literal> from <table_name> : shows a table with <literal> column added to all the records