

# SWE3003 Introduction to Database Systems - Midterm Exam Fall 2020

Student ID	Name

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Total
For Instructor/TA only,									

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1. Provide a brief description of the following terms. [20 pts]

a. Database and DBMS (Please describe the difference):

b. ———:

c. Physical Data Independence:

d. ——— :

2. Write each of the following queries in SQL for the given schema.

- student (student\_id, student\_name, department, GPA)

a. Find the average GPA of each department.

b. Find the ID of students whose GPA is higher than the average GPA of 'Computer Science' department.

3. Write each of the following queries in SQL for the given schema.

- employee (person\_name, street, city)
- works (person\_name, company\_name, salary)
- company (company\_name, city)
- manages (person\_name, manager\_name)

a. Find the names of all employees whose salaries are higher than some employees of “John Doe”.

b. Find the names of all employees whose salaries are higher than all the employees of “John Doe”.

4. Write SQL DDL statements to create the following schema.

- Student(student\_name, department\_name, email)
- Department(department\_name, building)

Each attribute is of variable length character type. You can decide the maximum length of each attribute. But, none of the attributes can be NULL. Also, department\_name attribute in Student table must always appear in Department table.

5. Consider the following relational database schema.

- $E(\underline{a1}, a2, a3, a4)$ .

Attribute “a1” is chosen to be the primary key of this relation. But “a2” is also a candidate key. I.e.,

- $a1 \rightarrow a2, a3, a4$
- $a2 \rightarrow a1, a3, a4$

Other than the two functional dependencies, there's no other functional dependency.

(a )How many super keys does this table have?

(b) Is this schema in BCNF? Justify your answer.