

**Tutorial 1: Entity-Relationship (ER)
Model (Solutions)**

CS3402 Database Systems

Question 1

- An instructor Peter does not know relational database management systems. He uses an Excel file to store university data. Here are some sample data stored in the Excel file.
 - a) Identify entities, attributes, and relationships in this application.
 - b) Is there any integrity constraint in this application? If so, is it easy to make sure the constraint(s) is not violated in Excel?

	A	B	C	D	E
1					
2		Course ID	Course Title	Instructor	
3		CS3402	Database Systems	Dr. Ada	
4		CS2303	Data Structures for Media	Dr. Betty	
5					
6		Student ID	Student Name	Programme	
7		500001	Alan	BSCCM	
8		500002	Bob	BSCCM2	
9		500003	Carson	BSCCM	
10		500004	David	BSC4	
11					
12		Student ID	Course ID	Grade	
13		500001	CS3402	A	
14		500001	CS2303	A	
15		500002	CS3402	B	
16		500003	CS3402	C	
17		500003	CS2303	B+	
18		500004	CS3402	A-	
19					
20					

Question 1a (Answer) (1/2)

- Entity: course, student, and instructor
- Entity set:
 - Course – the set of courses
 - Student – the set of students
 - Instructor – the set of instructors
- Attributes: (Note: You may add more attributes.)
 - Course – Course ID and Course Title
 - Student – Student ID, Student Name and Programme
 - Instructor – Instructor ID, Instructor Name and Department

Question 1a (Answer) (2/2)

- Relationships:
 - **Teaches** – an instructor teaches a course
 - **Takes** – a student takes a course (with the grade attribute)

Question 1b (Answer)

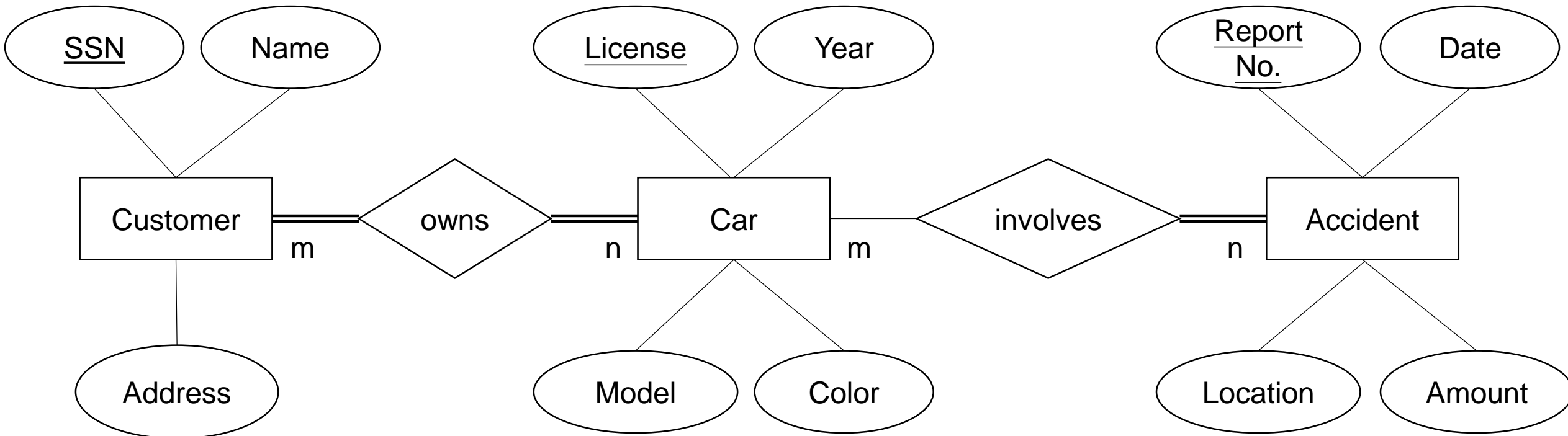
- Integrity Constraints: (Note: You may have more integrity constraints.)
 - No two students having the same Student ID
 - No two courses having the same Course ID
 - No two instructors having the same Instructor ID
 - One student can only take the course once
 - Some courses are offered to BSCCM students only
 - ...
- It is not easy to maintain integrity constraints in Excel. Need a relational database management system!!

Question 2

- Construct an ER diagram for a car insurance company. Identify the key entities, relationships and their attributes in the ER diagram.
 - a) A customer owns at least one car.
 - b) A car may be owned by more than one customer.
 - c) An accident involves at least one car.
 - d) A car may have a number of recorded accidents associated with it.

Question 2 (Answer)

- This answer is only a sample answer.

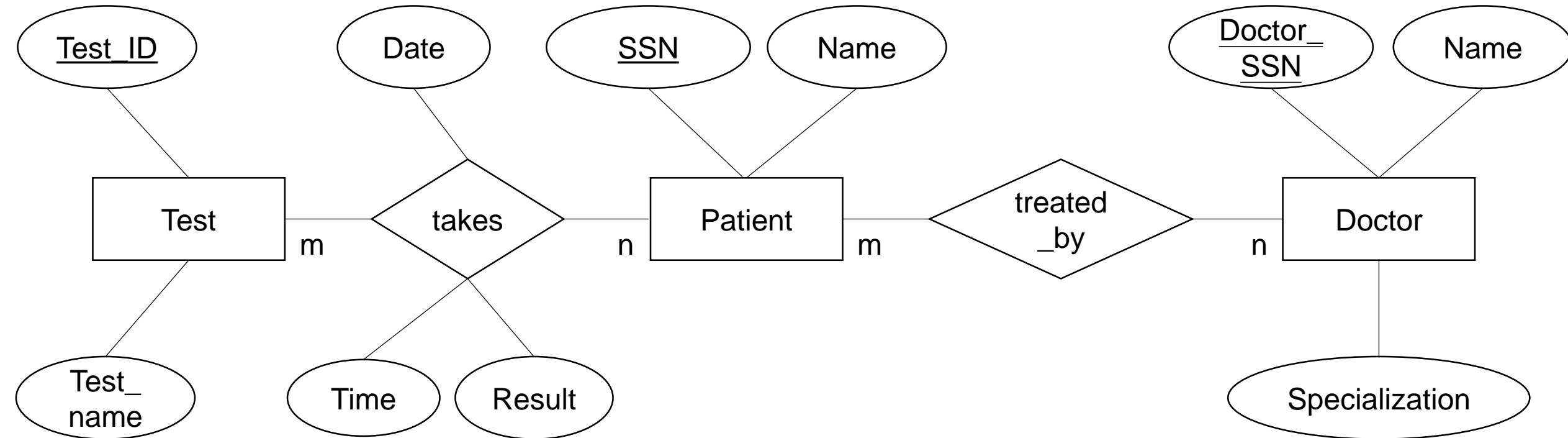


Question 3

- Construct an ER diagram for a hospital. Identify the key entities, relationships and their attributes in the ER diagram.
 - a) The hospital has a set of patients and a set of medical doctors.
 - b) A patient may be treated by more than one doctor.
 - c) A doctor may have a number of patients.
 - d) Various conducted tests and results are associated with their corresponding patients.

Question 3 (Answer)

- This answer is only a sample answer.



Question 3 (Answer)

- Another sample answer.

