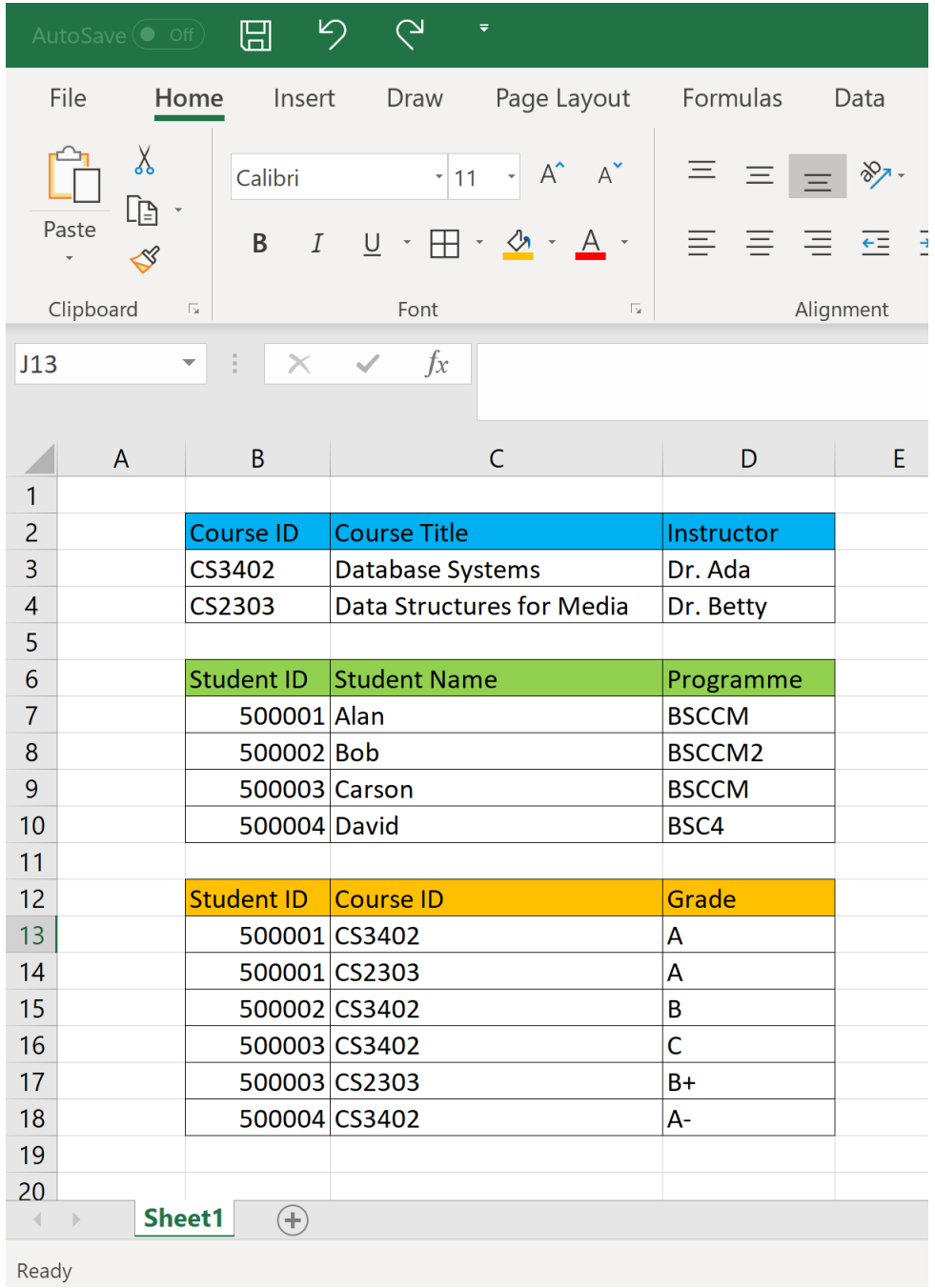
Tutorial 1: Entity-Relationship (ER) Model (Solutions)

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)

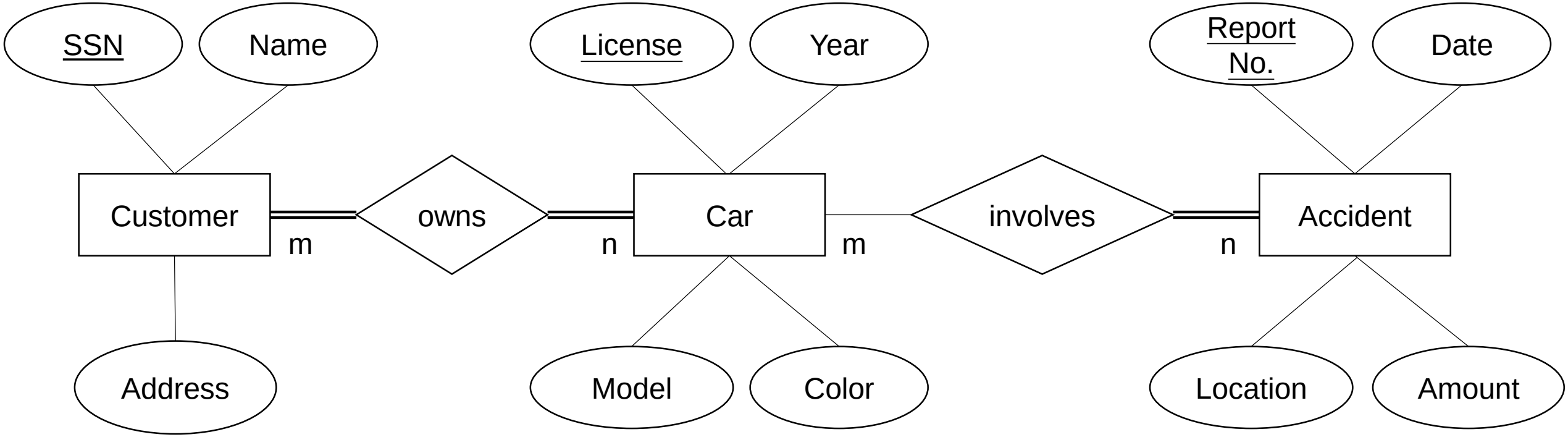
- Integrity Constraints: (Note: You may have more integrity constraints.)
  - No two students having the same Student ID
  - No two courses having the same Course ID
  - No two instructors having the same Instructor ID
  - One student can only take the course once
  - Some courses are offered to BSCCM 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.

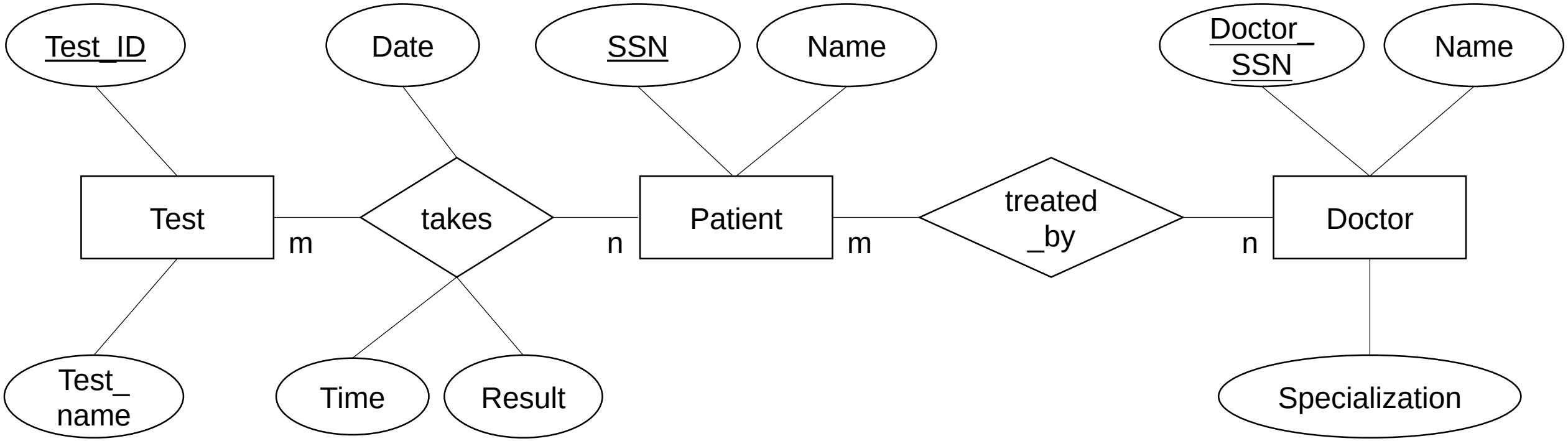


Question 3

- 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.