



Please answer all questions. Total pages: 2

Question 1: (16 points)

Define the following terms: Database System, Data Model, Database Schema, and Database State.

Question 2: (30 points)

Ministry of Health needs to keep track of hospitals, rooms, doctors, nurses, patients and room occupations. Each hospital has a unique number, number of beds, name, and address. A doctor has a name, gender, unique social security number, address, and subject area. A patient has name, gender, address, date of birth, ward, and unique social security number. A nurse has name, gender, unique social security number, address, department, and age. A room has a room number and number of beds. A doctor can work in only one hospital and may treat many patients, while a patient can be treated in many hospitals and by many doctors. A nurse is responsible for several rooms while a room is under responsibility of one nurse in a specific day of every week. Several patients may occupy one room. Room occupations need to record check in and check out dates.

Draw an enhanced-entity-relationship diagram that captures, as far as possible, the requirements stated above. If you make any assumptions in your design, please write them down. Assumptions, however, must not contradict the requirements.

Question 3: (24 point)

The database of a sailing club contains the following three tables about sailors, boats, and boat reservations made by the sailors. Attributes belonging to the primary key of a table are underlined.

Sailors

<u>sid</u>	name	rating	age
22	Ahmed	7	45.0
31	Ali	8	55.5
58	Mon	10	35.0
...

Boats

<u>id</u>	name	Color
101	Interlake	Blue
102	Interlake	Red
103	Clipper	Green
...

Reservations

<u>sid</u>	<u>bid</u>	<u>date</u>
22	101	10/10/2003
58	103	03/07/2003
...

Write SQL queries that answer the following questions:

- How many sailors have a rating greater than 8?
- What are the names of the sailors that have reserved a boat during the year 2003? (Show each such sailor only once).
- Who are the sailors that have never reserved a green boat?
- For every boat, which is the average age of the sailors that have made a reservation for the boat? (List the boats according to that average.)

- (e) Which are the names of the sailors who have reserved always the same boat?
- (f) What is the name and the age of the oldest sailor who has reserved a boat?
- (g) What is the name of the sailors that reserved all boats reserved by Ahmed?
- (h) Using outer join, what are the names of boats that are not reserved at all?

Question 4: (30 points)

Map the following EERD into a relational database schema.

