1. Construct an E-R diagram for a car-insurance company whose customers own one or more cars each. Each car has associated with it zero to any number of recorded accidents.

2. Construct an E-R diagram for a hospital with a set of patients and a set of medical doctors. Associate with each patient a log of the various tests and examinations conducted.

3. A university registrar's office maintains data about the following entities: (a) courses, including number, title, credits, syllabus, and prerequisites; (b) course offerings, including course number, year, semester, section number, instructor(s), timings, and classroom; (c) students, including student-id, name, and program; and (d) instructors, including identification number, name, department, and title. Further, the enrollment of students in courses and grades awarded to students in each course they are enrolled for must be appropriately modeled.

   Construct an E-R diagram for the registrar's office. Document all assumptions that you make about the mapping constraints.

4. Consider a database used to record the marks that students get in different exams of different course offerings.

   a. Construct an E-R diagram that models exams as entities, and uses a ternary relationship, for the above database.

   b. Construct an alternative E-R diagram that uses only a binary relationship between *students* and *course-offerings*. Make sure that only one relationship exists between a particular student and course-offering pair, yet you can represent the marks that a student gets in different exams of a course offering.

5. Design an E-R diagram for keeping track of the exploits of your favorite sports team. You should store the matches played, the scores in each match, the players in each match and individual player statistics for each match. Summary statistics should be modeled as derived attributes.

6. Consider a university database for the scheduling of classrooms for final exams. This database could be modeled as the single entity set *exam*, with attributes *course-name*, *section-number*, *room-number*, and *time*. Alternatively, one or more additional entity sets could be defined, along with relationship sets to replace some of the attributes of the *exam* entity set, as

   - *course* with attributes *name*, *department*, and *c-number*
   - *section* with attributes *s-number* and *enrollment*, and dependent as a weak entity set on *course*
   - *room* with attributes *r-number*, *capacity*, and *building*

   a. Show an E-R diagram illustrating the use of all three additional entity sets listed.

   b. Explain what application characteristics would influence a decision to include or not to include each of the additional entity sets.

7. Draw an ERD for the following situation. (State any assumptions you believe you have to make in order to develop a complete diagram.) Also, draw a data model for this situation using the tool you have been told to use in your course: Stillwater Antiques buys and sells one-of-akind antiques of all kinds (e.g., furniture, jewelry, china, and clothing). Each item is uniquely identified by an item number and is also characterized by a description, asking price, condition, and open-ended comments. Stillwater works with many different individuals, called clients, who sell items to and buy items from the store. Some clients only sell items to Stillwater, some only buy

items, and some others both sell and buy. A client is identified by a client number and is also described by a client name and client address. When Stillwater sells an item in stock to a client, the owners want to record the commission paid, the actual selling price, sales tax (tax of zero indicates a tax exempt sale), and date sold. When Stillwater buys an item from a client, the owners want to record the purchase cost, date purchased, and condition at time of purchase.

8. Transfer the following verbal description into an ERD:

   "A college can have many students however a student cannot study in multiple colleges at the same time".

9. Transfer the following verbal description into an ERD

   a. Customers (Cust-#) place orders that are assigned to periods (P-ID) as order headers.

   b. Products (Prod-#) are assigned to order headers as "Line Items"

10. Transfer the following verbal description into an ERM:

    a. An assignment includes many exercises (. Each exercise has a level (Lev-ID) of difficulty. The same level of difficulty (easy, medium or difficult) can be assigned to more than one exercise.

    b. An exercise consists of several contents (Cont-ID). Each content (e.g. partial question, partial solution,...) belongs to one exercise.

    c. Each exercise belongs to a category (Cat-ID). One category (sales & distribution, master data,...) can be assigned to several exercises.