database. The office uses three dental laboratories that provide supplies and services, such as fabricating dentures. Draw a complete E-R diagram for this example.

3.6 An interior design firm would like to have a database to represent its operations. A client (customer) requests that the firm perform a job such as decorating a new home, redecorating rooms, locating and purchasing furniture, and so forth. One of the firm's decorators is placed in charge of each job. For each job, the firm provides an estimate of the amount of time and money required for the entire job. Some of the work for a job, such as planning furniture placement, is done by the decorator in charge of the job. In addition, the firm might hire contractors to work on a daily or hourly basis on a particular job. A job might also include several activities, such as painting, installing floor covering, fabricating draperies, wallpapering, constructing, installing cabinets, and so on. These activities are done by contractors hired by the firm. The contractor provides an estimate for each activity. An activity or job might also require materials such as paint or lumber, and the firm has to keep track of the cost of materials for each activity or job in order to bill the client. The database should store the estimated costs and actual costs of all activities and all jobs. Draw a complete E-R diagram for this example.

3.7 An automobile body repair shop needs to keep information about its operations. Customers initially bring their cars to the shop for an estimate of repairs. A mechanic looks at the car and estimates the cost and time required for the entire job. If the customer accepts the estimate, a job number is assigned and the customer's name and contact information; the car's license plate number, make, model, and year; and a list of the repairs needed are recorded. The customer then makes an appointment to bring in the car on a specified date. When the car is brought in for repairs, the work begins. The shop keeps track of the charges for parts and labor as they accumulate. Only one mechanic works on the car for the entire job. A job might include several repairs (e.g., replacing the left fender, painting the passenger door). The time actually spent for each repair is recorded and used to calculate the cost of labor, using a fixed hourly rate. Draw a complete E-R diagram for this example.

3.8 A database is needed to keep track of the operations of a physical therapy center. Every patient must be referred by a physician and have a prescription for physical therapy in order to receive

b. Describe the domain of the `cost` attribute, making assumptions as needed.
c. Identify a superkey for the `Book` entity set.
d. Identify all candidate keys for the entity set.
e. Identify a primary key for the entity set and underline it on the E-R diagram.

3.3 a. Assume that in the same scenario as in Exercise 3.2, there is an entity set called `Purchase` with attributes `purchaseDate`, `totalAmount`, and any others you wish to add to describe book purchases. A purchase may include several books. Show how this entity set and its relationship to `Book` would be represented on the E-R diagram.
b. Stating any necessary assumptions, make a decision about the cardinality and participation constraints of the relationship, and add appropriate symbols to the E-R diagram.
c. Assume there is another entity called `Seller` to be added to the diagram. The book collector makes purchases from many sellers, but each purchase is made from one seller. Making up attributes as needed, add this entity and appropriate relationship(s) to the diagram.

3.4 Design a database to keep data about college students, their academic advisors, the clubs they belong to, the moderators of the clubs, and the activities that the clubs sponsor. Assume each student is assigned to one academic advisor, but an advisor counsels many students. Advisors do not have to be faculty members. Each student can belong to any number of clubs, and the clubs can sponsor any number of activities. The club must have some student members in order to exist. Each activity is sponsored by exactly one club, but there might be several activities scheduled for one day. Each club has one moderator, who might or might not be a faculty member. Draw a complete E-R diagram for this example. Include all constraints.

3.5 A dentist's office needs to keep information about patients, the number of visits they make to the office, work that must be performed, procedures performed during visits, charges and payments for treatment, and laboratory supplies and services. Assume there is only one dentist, so there is no need to store information about the dentist in the database. There are several hundred patients. Patients make many visits, and the database should store information about the services performed during each visit and the charges for each of the services. There is a standard list of charges, kept outside the