1. Give brief definitions for the following terms: data, database, DBMS, database system, database application, meta-data, data independence, user view, DBA, database designer, end user, canned query, persistence, concurrency, transaction, integrity constraint, redundancy, data model, internal schema, conceptual schema, external schema.

2. Draw a complete E-R diagram for any two of the following enterprises. Define appropriate attributes as needed. Include cardinality and participation constraints.

   a) Design a database to keep data about college students, their academic advisors, the clubs they belong to, the sponsors 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 must 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 sponsor, who might or might not be a faculty member.

   b) 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 database. The office uses three dental laboratories that provide supplies and services, such as fabricating dentures.

   c) 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.
d) 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.

e) 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 treatments. A patient may have different physicians at different times. The database keeps all information about prescriptions and treatments, both past and current. When appointments are made, the information about scheduled date and time is recorded. No patient is ever scheduled for two visits on one day. The center has several physical therapists, and a patient may be treated by different physical therapists at different visits. When a patient makes a visit at an appointed time, the name of the therapist, the treatment, the date, time, and the equipment used are all recorded for that visit. Each of these has only one value for the visit. This information will be used later for insurance billing, which is not part of the database.

Enterprise descriptions borrowed from *Databases Illuminated* by Catherine M. Ricardo, Jones and Bartlett, 2004.

Include your name, the assignment number and the submission date at the top of the first page of every submitted file.

Homework submissions must be typeset. Hand-written assignments will not be accepted. Diagrams can be drawn with any available tool. A good tool for creating ER diagrams is Dia (available for free at [http://www.gnome.org/projects/dia/](http://www.gnome.org/projects/dia/)). Word or Visio documents are also acceptable.

Completed assignments should be submitted through Blackboard.