ER EXERCISE

1. For each of the following pairs of rules, identify two entity types and one relationship. Draw the ER diagram.
   - A department employs many persons. A person is employed by, at most, one department.
   - A manager manages, at most, one department. A department is managed by, at most, one manager.
   - An author may write many books. A book may be written by many authors.
   - A team consists of many players. A player plays for only one team.
   - A lecturer teaches, at most, one course. A course is taught by exactly one lecturer.
   - A flight-leg connects two airports. An airport is used by many flight-legs.
   - A purchase order may be for many products. A product may appear on many purchase orders.
   - A customer may submit many orders. An order is for exactly one customer.
2. Draw an ER diagram for the following. Be sure to indicate the cardinality for each relationship.

   - A college runs many classes. Each class may be taught by several teachers, and a teacher may teach several classes. A particular class always uses the same room. Because classes may meet at different times or on different evenings, it is possible for different classes to use the same room.
   - Each employee in an engineering company has at most one recognized skill, but a given skill may be possessed by several employees. An employee is able to operate a given machine-type (e.g., lathe, grinder) if he has one of several skills, but each skill is associated with the operation of only one machine type. Possession of a given skill (e.g., mechanic, electrician) allows an employee to maintain several machine-types, although maintenance of any given machine-type requires a specific skill (e.g., a lathe must be maintained by a mechanic).

3. Draw an ER diagram for each of the following situations.

   - A company has a number of employees. Each employee may be assigned to one or more projects, or may not be assigned to a project. A project must have at least one employee assigned, and may have several employees assigned.
   - A university has a large number of courses in its catalog. Each course may have one or more other courses as prerequisistes, or may have no prerequisites.
   - A college course may have one or more scheduled sections, or may not have a scheduled section.
   - A hospital patient has a patient history. Each patient has one or more history records (we assume that the initial patient visit is always recorded as an instance of the history). Each patient history record belongs to exactly one patient.
   - A video store may stock more than one copy of a given movie. It is also true that the store may not have a single copy of a paticular movie.