Assignment #3
Due Tuesday October 24, 5:00 PM

Problems to Work and Hand In

1. (10 pts.) Here it is again! The *Beer Drinkers' Database* consists of information about beers, drinkers, and bars, telling:

   (a) The name of each beer, bar, and drinker.

   (b) The address of each bar.

   (c) The beers liked by each drinker.

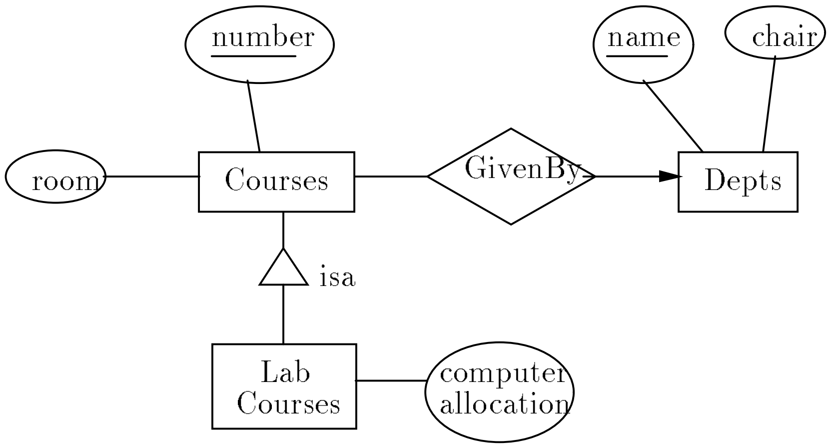
   (d) The beers served by each bar.

   (e) The bars frequented by each drinker.

   Give a network-model representation for the Beer Drinkers' Database.

2. (10 pts.) Give a hierarchical-model representation for the Beer Drinkers' Database.

3. (10 pts.) Below is an E/R diagram. Please convert it to a relational database schema, i.e., a list of relation names R and their attributes $A_1, \ldots, A_n$) shown as $R(A_1, \ldots, A_n)$. Indicate keys by underlining the key attribute(s).



   Note that *Courses* is a weak entity set, taking its key from its own number and the name of its department (which differs from previous examples, where *Courses* was thought to have a unique name). Also observe that we are using the triangle pointing to the superclass to represent an "isa" relationship, rather than the diamond and arrow used in the course reader. Either notation is acceptable in the future.

4. (10 pts.) On the next page is an ODL description of a schema similar to the E/R diagram of Problem 3. Please convert it to a relational database schema.

```
interface Course {
    attribute int number;
    attribute string room;
    relationship Dept deptOf inverse Dept::coursesOf;
}

interface LabCourse : Course {
    attribute int computerAlloc;
}

interface Dept {
    unique attribute string name;
    attribute string chair;
    relationship Set<Course> coursesOf inverse Course::deptOf;
}
```

Remember that `Course` objects have an "object identity," and you may invent an attribute representing this OID, e.g., `CourseID`. You should *not* mimic the strategy used to convert a weak entity set in Problem 3 (although in real life you could do so if you wished).

5. (10 pts.) Suppose we have a relation $R(A, B, C, D, E)$ with functional dependencies $A \rightarrow B$, $B \rightarrow C$, $BD \rightarrow E$, and $AE \rightarrow D$. Find the keys of R and justify your answer. That is, for each key X that you find, use the closure test to show that $X^+ = ABCDE$, and show that for each proper subset $Y \subset X$, $Y^+ \neq ABCDE$.

Third Step of Your Personal Database Application

1. (25 pts.) Convert either your ODL description of your PDA or your E/R diagram for your PDA (from assignments 1 or 2) into a relational database schema. Are you happy with the resulting schema? If not, you may change the schema (show both the directly-constructed schema and your preferred schema).

2. (0 pts., but very important) Familiarize yourself with the Sybase relational DBMS by logging into Sybase, reading documentation, running various help functions, etc., as described in Handout #10: *Getting Started with Sybase*. You don't need to turn anything in for this problem.

3. (25 pts.) Create relations for your PDA in the Sybase system according to the schema you gave in Problem 1 of this assignment. Turn in a script showing your commands for creating the relations and showing a Sybase session in which the relations are successfully created. Note that HO#10 gives some examples of creating relations and tells you how to create a script for a session.