This problem set is due at **11:55pm on Friday, March 27, 2020.** Don’t go by the due date that you see on Blackboard because it is in EDT. Go by the one given in this handout.

Be sure to include a comment at the top of each file submitted that gives your name and email address.

Submit all the files that make up your solutions as a single zip or tar file on Blackboard. Multiple submissions are allowed before the due date. If you want to submit yours in a hard copy, you may slide it under my door by the due date. Make sure you write it legibly.

### Problem 1

A university database contains information about professors (identified by social security number, or SSN) and courses (identified by courseid). Professors teach courses; each of the following situations concerns the Teaches relationship set. For each situation, draw a separate ER diagram that describes it, assuming no further constraints hold.

1. Professors can teach the same course in several semesters, and each offering must be recorded.

2. Professors can teach the same course in several semesters, and only the most recent such offering needs to be recorded. Assume this condition applied in all subsequent questions.

3. Every professor must teach some course.

4. Every professor teaches exactly one course, no more, no less.

5. Every professor teaches exactly one course, no more, no less, and every course must be taught by some professor.

6. Now, suppose that certain courses can be taught by a team of professors jointly, but it is possible that no one professor in a team can teach the course. Model this situation, introducing additional entity sets and relationship sets if necessary.

### Problem 2

A company database needs to store information about employees (identified by ssn, with salary and phone as attributes), departments (identified by dno, with dname and budget as attributes), and children of employees (with name, age, and relationship to the employee as attributes). Employees work in departments; each department is managed by an employee; a child must be identified uniquely by name when the parent (who is an employee; assume that only one parent works for the company) is known. We are not interested in information about a child once the parent leaves the company. Draw an ER diagram that captures this information.
Problem 3 (An additional problem for CSE 532 students only)

Although you always wanted to be an artist, you ended up being an expert on databases because you love to cook data and you somehow confused database with data baste. Your old love is still there, however, so you set up a database company, ArtBase, that builds a product for art galleries. The core of this product is a database with a schema that captures all the information that galleries need to maintain. Galleries keep information about artists, their names (which are unique), birthplaces, age, and style of art. For each piece of artwork, the artist, the year it was made, its unique title, its type of art (e.g., painting, lithograph, sculpture, photograph), and its price must be stored. Pieces of artwork are also classified into groups of various kinds, for example, portraits, still lifes, works by Picasso, or works of the 19th century; a given piece may belong to more than one group. Each group is identified by a name (like those just given) that describes the group. Finally, galleries keep information about customers. For each customer, galleries keep that person’s unique name, address, total amount of dollars spent in the gallery (very important!), and the artists and groups of art that the customer tends to like. Draw the ER diagram for the database.