1. Design an ER schema (in the style of Figure 3.2 of Elmasri & Navathe) for the following set of requirements pertaining to a UNIVERSITY database application.

**Each student:**

- has a unique SSN
- has a name comprised of a first name and last name
- has a birthdate comprised of a month, day, and year
- has one or more academic majors
- has taken some courses, earning a grade each time

**Each academic department:**

- has a unique name
- has a main office at some location on campus
- has a telephone number
- has faculty members who work for it, one of whom assumed, on some date, the position of department chair
- offers sections of its courses

**Each academic major:**

- has a name
- is associated to a department

**Each academic course:**

- is associated to a department
- has a number, which, in combination with the department to which it is associated, uniquely identifies it
- has a name
• is worth a certain number of credit hours

• has zero or more prerequisite courses

Each course section:

• is an offering of some academic course

• has a number (which, together with the course of which it is an offering, uniquely identifies it)

• is taught by a faculty member

• is populated by students, each of whom is taking it with a “grade mode” of either pass/fail, normal, or audit.

Each faculty member:

• has a unique ID

• works for one or more academic departments

• is teaching zero or more sections of courses, all of which are offered by the department(s) for which (s)he works

Make sure to indicate (using the diagrammatic conventions shown in Figure 3.14 and used in Figure 3.2)

• which are the strong and which are the weak entity types

• key attribute(s) of each strong entity type

• partial key attribute(s) of each weak entity type

• which are the regular and which are the identifying relationship types

• for each relationship type, to which constraints (of the cardinality ratio and participation varieties) it must conform

Note any assumptions you made to fill in missing requirements or to clarify existing ones. Note any (conditions specified within the) requirements that you could not figure out how to express within the ER schema.

2. Using the seven-step procedure described in Section 9.1 of Elmasri & Navathe, transform into a relational schema the ER schema you produced in doing the problem above.

For each relation in your schema, and each attribute in each relation, indicate which of the seven steps called for its introduction.