1. Create a database named student\_management\_system. Write the SQL statement and explain what a database represents in a database management system.
2. Switch to using the student\_management\_system database you just created. What SQL command allows you to select a specific database to work with?
3. Create a table named students with the following columns:
   * student\_id (integer, primary key, auto-increment)
   * first\_name (varchar, maximum 50 characters, not null)
   * last\_name (varchar, maximum 50 characters, not null)
   * date\_of\_birth (date)
   * email (varchar, maximum 100 characters, unique)
   * enrollment\_date (date, default current date)

Include the SQL statement and explain what each constraint does.

1. Insert three sample student records into the students table. Write the SQL statements and explain the difference between a table, a row, and a column in database terminology.
2. Create a table named courses with the following columns:
   * course\_id (integer, primary key, auto-increment)
   * course\_name (varchar, maximum 100 characters, not null)
   * course\_code (varchar, maximum 20 characters, unique)
   * credit\_hours (integer, not null)
   * department (varchar, maximum 50 characters)

Write the complete SQL statement.

1. Insert five different courses into the courses table. What makes a primary key different from other columns?
2. Create a table named enrollments that establishes a many-to-many relationship between students and courses with the following columns:
   * enrollment\_id (integer, primary key, auto-increment)
   * student\_id (integer, foreign key referencing students table)
   * course\_id (integer, foreign key referencing courses table)
   * enrollment\_date (date, default current date)
   * grade (char, maximum 2 characters)

Include proper foreign key constraints. Explain what a foreign key is and why it's important.

1. Create a table named instructors with appropriate columns including instructor\_id as the primary key. Include at least 5 attributes that would be relevant for instructors. Explain what an entity is in database terminology.
2. Create a table named departments with a primary key and at least 3 additional relevant attributes. Insert at least 3 sample departments. What is the difference between a table and an entity in database design?
3. Modify the courses table to add a foreign key column instructor\_id that references the instructors table. Explain the SQL commands needed and what happens if you try to delete an instructor who is assigned to a course.
4. Create a table named buildings with a primary key and at least 3 relevant attributes. Then create a table named classrooms that has a foreign key referencing the buildings table. Explain what a one-to-many relationship is.
5. Design and create a students\_contact\_info table that has a one-to-one relationship with the students table. Explain how to implement a one-to-one relationship in database design.
6. Create a table named course\_materials with appropriate columns including a foreign key referencing the courses table. What type of relationship exists between courses and course materials?
7. Create a table named student\_attendance that tracks daily attendance for students in each course. Include appropriate primary and foreign keys. Explain why this table needs a composite key.
8. Create an ER diagram (submit as an image or description) showing all the tables you've created so far and their relationships. Identify and explain each type of relationship present.
9. Modify the students table to add a new column student\_number that must be unique. Write the SQL statement and explain what the UNIQUE constraint ensures.
10. Create a table named faculty with a primary key and include a column faculty\_code that has both NOT NULL and UNIQUE constraints. Explain the difference between a primary key and a unique key.
11. Create a table named majors with a composite primary key consisting of major\_code and concentration. Explain what a composite key is and when you would use one.
12. Add a DEFAULT constraint to the courses table that sets credit\_hours to 3 if no value is specified. Write the SQL statement and explain what DEFAULT constraints are used for.
13. Create a table named semesters with an appropriate primary key and add a CHECK constraint that ensures the end\_date is later than the start\_date. Explain how CHECK constraints help maintain data integrity.
14. Add a foreign key to the students table that references the majors table. What happens if you try to add a student with a major that doesn't exist?
15. Create a table named prerequisites that establishes which courses are prerequisites for other courses. This should have foreign keys referencing the courses table twice. Explain how this self-referential relationship works.
16. Modify the courses table to add a foreign key referencing the departments table. Set it to CASCADE on update and SET NULL on delete. Explain what these referential actions do.
17. Create a table named student\_projects with a foreign key to the students table. Configure the foreign key to CASCADE on both update and delete. Explain when this would be appropriate.
18. Create a table named course\_sections with a composite primary key combining course\_id and section\_number. Add foreign key to reference the courses table. Explain why section\_number alone wouldn't be a good primary key.
19. Add a UNIQUE constraint to the instructors table that combines first\_name, last\_name, and date\_of\_birth. Explain why this might be useful for preventing duplicate instructor records.
20. Create a table named scholarships with an appropriate primary key and add a CHECK constraint that ensures the amount column is greater than zero. Explain how this protects data integrity.
21. Create a table named grades with foreign keys to both students and courses tables and a CHECK constraint that ensures the grade value is between 0 and 100. What relational integrity rules does this enforce?
22. Modify the students table to add a candidate key on the combination of first\_name, last\_name, and date\_of\_birth. Explain what a candidate key is.
23. Create a table named library\_books with a surrogate key as the primary key, but also a natural key using the ISBN. Explain the difference between surrogate and natural keys.