Assignment 4: Write SQL statements to CREATE a new database and tables that reflect the library schema you designed earlier. Use ALTER statements to modify the table structures and DROP statements to remove a redundant table.

Solution:

1. Create a New Database

```
CREATE DATABASE LibraryDB;
```

2. Use the New Database

```
USE LibraryDB;
```

3. Create Tables

Create Genres Table

```
CREATE TABLE Genres (
   GenreID INT AUTO_INCREMENT PRIMARY KEY,
   GenreName VARCHAR(255) UNIQUE NOT NULL
);
```

Create Books Table

```
CREATE TABLE Books (
   BookID INT AUTO_INCREMENT PRIMARY KEY,
   Title VARCHAR(255) NOT NULL,
   ISBN VARCHAR(13) UNIQUE NOT NULL,
   Publisher VARCHAR(255) NOT NULL,
   YearPublished YEAR NOT NULL CHECK (YearPublished >= 1450 AND
YearPublished <= YEAR(CURDATE())),
   GenreID INT NOT NULL,
   FOREIGN KEY (GenreID) REFERENCES Genres(GenreID)
);
```

Create Authors Table

```
CREATE TABLE Authors (
   AuthorID INT AUTO_INCREMENT PRIMARY KEY,
   FirstName VARCHAR(255) NOT NULL,
   LastName VARCHAR(255) NOT NULL
);
```

Create Books_Authors **Table (junction table for many-to-many relationship)**

```
CREATE TABLE Books_Authors (
   BookID INT NOT NULL,
   AuthorID INT NOT NULL,
   PRIMARY KEY (BookID, AuthorID),
   FOREIGN KEY (BookID) REFERENCES Books(BookID),
   FOREIGN KEY (AuthorID) REFERENCES Authors(AuthorID)
);
```

Create Members **Table**

```
CREATE TABLE Members (
   MemberID INT AUTO_INCREMENT PRIMARY KEY,
   FirstName VARCHAR(255) NOT NULL,
   LastName VARCHAR(255) NOT NULL,
   Email VARCHAR(255) UNIQUE NOT NULL,
   Phone VARCHAR(15) NOT NULL,
   Address VARCHAR(255) NOT NULL,
   MembershipDate DATE NOT NULL
);
```

Create Loans **Table**

```
CREATE TABLE Loans (
   LoanID INT AUTO_INCREMENT PRIMARY KEY,
   BookID INT NOT NULL,
   MemberID INT NOT NULL,
   LoanDate DATE NOT NULL,
   ReturnDate DATE NULL,
   DueDate DATE NOT NULL,
   CHECK (ReturnDate IS NULL OR ReturnDate >= LoanDate),
   FOREIGN KEY (BookID) REFERENCES Books(BookID),
   FOREIGN KEY (MemberID) REFERENCES Members(MemberID)
```

);

4. ALTER Statements to Modify Table Structures

Example: Add a new column MiddleName to Members **table**

```
ALTER TABLE Members
ADD MiddleName VARCHAR(255);
```

Example: Modify ISBN **to be 17 characters long**

```
ALTER TABLE Books
MODIFY ISBN VARCHAR(17) UNIQUE NOT NULL;
```

5. DROP Statement to Remove a Redundant Table

Example: Drop Books_Authors **table if it is redundant**

```
DROP TABLE Books_Authors;
```

Complete SQL Script

```
-- Create the database
CREATE DATABASE LibraryDB;

-- Use the new database
USE LibraryDB;

-- Create Genres table
CREATE TABLE Genres (
   GenreID INT AUTO_INCREMENT PRIMARY KEY,
   GenreName VARCHAR(255) UNIQUE NOT NULL
);

-- Create Books table
CREATE TABLE Books (
   BookID INT AUTO_INCREMENT PRIMARY KEY,
   Title VARCHAR(255) NOT NULL,
   ISBN VARCHAR(13) UNIQUE NOT NULL,
   Publisher VARCHAR(255) NOT NULL,
   YearPublished YEAR NOT NULL CHECK (YearPublished >= 1450 AND
YearPublished <= YEAR(CURDATE())),
```

```
    GenreID INT NOT NULL,
    FOREIGN KEY (GenreID) REFERENCES Genres(GenreID)
);

-- Create Authors table
CREATE TABLE Authors (
    AuthorID INT AUTO_INCREMENT PRIMARY KEY,
    FirstName VARCHAR(255) NOT NULL,
    LastName VARCHAR(255) NOT NULL
);

-- Create Books_Authors table
CREATE TABLE Books_Authors (
    BookID INT NOT NULL,
    AuthorID INT NOT NULL,
    PRIMARY KEY (BookID, AuthorID),
    FOREIGN KEY (BookID) REFERENCES Books(BookID),
    FOREIGN KEY (AuthorID) REFERENCES Authors(AuthorID)
);

-- Create Members table
CREATE TABLE Members (
    MemberID INT AUTO_INCREMENT PRIMARY KEY,
    FirstName VARCHAR(255) NOT NULL,
    LastName VARCHAR(255) NOT NULL,
    Email VARCHAR(255) UNIQUE NOT NULL,
    Phone VARCHAR(15) NOT NULL,
    Address VARCHAR(255) NOT NULL,
    MembershipDate DATE NOT NULL
);

-- Create Loans table
CREATE TABLE Loans (
    LoanID INT AUTO_INCREMENT PRIMARY KEY,
    BookID INT NOT NULL,
    MemberID INT NOT NULL,
    LoanDate DATE NOT NULL,
    ReturnDate DATE NULL,
    DueDate DATE NOT NULL,
    CHECK (ReturnDate IS NULL OR ReturnDate >= LoanDate),
```

```
    FOREIGN KEY (BookID) REFERENCES Books(BookID),
    FOREIGN KEY (MemberID) REFERENCES Members(MemberID)
);

-- Example ALTER statements
ALTER TABLE Members ADD MiddleName VARCHAR(255);
ALTER TABLE Books MODIFY ISBN VARCHAR(17) UNIQUE NOT NULL;

-- Example DROP statement
DROP TABLE Books_Authors;
```

This script creates the database and tables, modifies the table structures as needed, and includes a drop statement to remove a redundant table.