

Hand in a hardcopy of your answers (printed or handwritten). Include your name, and be sure to clearly identify which problems you are answering and which homework the problems are from since problems from multiple homeworks will be collected at the same time. These problems will be collected on Monday 10/26.

You may use the MySQL database to develop and test your statements, but be sure to still think through what each query is doing for yourself in order to practice and build your skills at reading and understanding SQL.

- *Use the `username_library` database (where `username` is your username) and connect to the database with your individual MySQL account (rather than `guest`) so that you have permission to modify the data.*
 - *You will need to create and populate the tables yourself (this was partially done in homework 10). The data used in this homework is very similar to the data files provided for homework 10 — load them as a starting point and then hand-edit as needed (one additional row in each of `PUBLISHER` and `BOOK` and one changed returned date in `BOOK_LOANS`). Note questions 1–3 only use three tables and expect the others to be empty.*
 - *You may get an error about safe mode preventing deletions or updates. This is a configuration option in MySQL Workbench — follow the instructions in the error message about how to turn safe mode off, then try again.*
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Use the following relational schema:

```
BOOK(Book_id, Title, Publisher_name)
BOOK_AUTHORS(Book_id, Author_name)
BOOK_COPIES(Book_id, Branch_id, No_of_copies)
BOOK_LOANS(Loan_id, Book_id, Branch_id, Card_no, Date_out, Due_date,
           Returned_date)
BORROWER(Card_no, Name, Address, Phone)
LIBRARY_BRANCH(Branch_id, Branch_name, Address)
PUBLISHER(Name, Address, Phone)
```

- Loan IDs (Loan_id) are generated automatically.
- By default, a loan's check out date is the current date and its due date is two weeks after the check out date. All other default values are NULL.
- BOOK.Title is NOT NULL.
- No two books from the same publisher can have the same title: UNIQUE (Title, Publisher_name) in BOOK.
- A loan's due date can't be before its check out date (a CHECK constraint).

The foreign keys: ($\rightarrow$ reads as "refers to")

- BOOK.Publisher_name $\rightarrow$ PUBLISHER.Name
- BOOK_AUTHORS.Book_id $\rightarrow$ BOOK.Book_id uses ON DELETE CASCADE
- BOOK_LOANS.Book_id $\rightarrow$ BOOK.Book_id
- BOOK_LOANS.Branch_id $\rightarrow$ LIBRARY_BRANCH.Branch_id and
BOOK_LOANS.Card_no $\rightarrow$ BORROWER.Card_no
- BOOK_COPIES.Book_id $\rightarrow$ BOOK.Book_id and
BOOK_COPIES.Branch_id $\rightarrow$ LIBRARY_BRANCH.Branch_id

Unless specified otherwise, assume that deletion is restricted but updates are cascaded.

PUBLISHER

Name	Address	Phone
DAW	375 Hudson St, New York, NY 10014	123-456-7890
Eos	10 East 53rd St, New York, NY 10022	212-207-7000
Tor	120 Broadway, New York, NY 10271	646-307-5151

BOOK

Book_id	Title	Publisher_name
1	Foreigner	DAW
2	Invader	DAW
3	Mission Child	Eos
4	Fortress in the Eye of Time	Eos
5	Cyteen	NULL

BOOK_AUTHORS

Book_id	Author_name
1	C. J. Cherryh
2	C. J. Cherryh
3	Maureen F. McHugh
4	C. J. Cherryh

Figure 1: Data for all questions.

Questions 1–3 use the data in figure 1. The other tables (BOOK_COPIES, BOOK_LOANS, BORROWER, and LIBRARY_BRANCH) are empty for these exercises.

1. Are these legal INSERT statements given the data above? If not, explain why. Consider each statement separately; they are not cumulative.

- (a) `INSERT INTO BOOK (Book_id, Title, Publisher_name)
VALUES (6, 'Rimrunners', 'Warner Books');`
- (b) `INSERT INTO BOOK (Book_id, Title, Publisher_name)
VALUES (6, 'Rimrunners', NULL);`
- (c) `INSERT INTO BOOK
VALUES (6, 'Cyteen', NULL);`
- (d) `INSERT INTO BOOK (Book_id, Publisher_name)
VALUES (6, 'Eos');`
- (e) `INSERT INTO BOOK_AUTHORS (Book_id, Author_name)
SELECT Book_id, 'C. J. Cherryh'
FROM BOOK
WHERE Publisher_name = 'Eos';`
- (f) `INSERT INTO BOOK_AUTHORS (Book_id, Author_name)
SELECT Book_id, 'Jane Fancher'
FROM BOOK
WHERE Publisher_name = 'Eos';`
- (g) `INSERT INTO BOOK_LOANS (Book_id, Date_out, Due_date)
VALUES (5, CURDATE(), NULL);`

2. For each of the following, how many rows will be updated in each table? If a statement fails, explain why. Consider each statement separately, applied to the data above.

- (a) `UPDATE BOOK
SET Publisher_name = 'Eos'
WHERE Book_id >= 3;`
- (b) `UPDATE PUBLISHER
SET Name = 'DAW Books'
WHERE Name = 'DAW';`
- (c) `UPDATE BOOK
SET Book_id = Book_id + 1;`
- (d) `UPDATE BOOK
SET Title = 'Foreigner'
WHERE Publisher_name = 'DAW';`

3. For each of the following, how many rows will be deleted from each table? If a statement fails, explain why. Consider each statement separately, applied to the data above.

- (a) `DELETE FROM BOOK_AUTHORS`
`WHERE Book_id < 3;`
- (b) `DELETE FROM BOOK_AUTHORS`
`WHERE Author_name = 'C. J. Cherryh' OR`
`( Author_name = 'Maureen F. McHugh' AND Book_id > 3 );`
- (c) `DELETE FROM BOOK`
`WHERE NOT EXISTS (SELECT *`
`FROM BOOK_AUTHORS`
`WHERE BOOK_AUTHORS.Book_id = BOOK.Book_id);`
- (d) `DELETE FROM PUBLISHER`
`WHERE Name <> 'DAW';`

Answer for each of the following ON DELETE actions on BOOK.Publisher_name:

- (i) no action
 - (ii) ON DELETE SET NULL
 - (iii) ON DELETE CASCADE
- (e) `DELETE FROM PUBLISHER`
`WHERE Name NOT IN (SELECT Publisher_name FROM BOOK);`
 - (f) `DELETE FROM BOOK;`
 - (g) `DELETE FROM BOOK`
`WHERE Publisher_name = NULL;`
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LIBRARY_BRANCH

Branch_id	Branch_name	Address
1	Geneva Public Library	Geneva
2	Wood Library	Canandaigua
3	Central Library	Rochester
4	Fairport Public Library	Fairport
5	Pittsford Community Library	Pittsford
6	Wadsworth Library	Geneseo
7	Walworth-Seely Public Library	Walworth
8	Arcade Free Library	Arcade
9	Bell Memorial Library	Nunda
10	Newark Public Library	Newark
11	Livonia Public Library	Livonia
12	Mount Morris Public Library	Mount Morris
13	Red Creek Free Library	Red Creek
14	Avon Free Library	Avon
15	Cordelia A. Greene	Castile
16	Sodus Free Library	Sodus
17	Dansville Public Library	Dansville

BOOK_COPIES

Book_id	Branch_id	No_of_copies
1	2	1
1	7	2
1	8	1
1	9	3
1	10	4
1	14	2
1	15	1
1	16	3
2	2	2
2	6	1
2	7	4
2	8	2
2	9	3
2	10	4
2	11	1
3	2	1
3	17	1
4	6	3
4	8	2
4	12	3
4	13	4

BORROWER

Card_no	Name	Address	Phone
1	Bren Cameron	Shejidan, Western Association	456-123-7890
2	Danny Fisher	Shamesey, Finisterre	789-142-2432
3	Tara Chang	Tarmin, Finisterre	789-342-8659
4	Cefwyn Marhanen	Guelemara, Guelessar	547-542-9874
5	Arthur Dent	Islington	630-685-9124
6	Ford Prefect	Betelgeuse	589-284-6735

BOOK_LOANS

Loan_id	Book_id	Branch_id	Card_no	Date_out	Due_date	Returned_date
1	1	2	5	2006-08-05	2006-11-05	NULL
2	2	2	3	2006-08-06	2006-10-06	2006-10-01
3	4	6	1	2006-10-07	2006-10-17	NULL
4	2	7	5	2006-09-08	2006-10-18	NULL
5	4	8	2	2006-10-05	2006-11-05	NULL
6	1	8	6	2006-10-16	2006-11-06	NULL
7	1	14	6	2006-11-07	2006-11-17	NULL
8	1	14	3	2006-11-08	2006-11-18	NULL

Figure 2: Additional data for questions 4–6.

Questions 4–6 use the data in figures 1 and 2.

4. Write statements to do the following.
 - (a) Add a new borrower: card number 7, Zaphod Beeblebrox, who lives in Betelgeuse and whose phone number is 589-555-4242.
 - (b) Cefwyn Marhanen checked out *Mission Child* from Wood Library on 10/7/2026 with the standard due date.
 - (c) Add the book *Alliance Rising* (book id 6), published by DAW and written by C. J. Cherryh and Jane S. Fancher.
 - (d) The Geneva Public Library, which currently has no copies of any book from Eos, is adding one copy of each book published by Eos to its collection. Use only a single statement.
5. Write statements to do the following. Also report how many rows would be updated. Treat each as an isolated task; the changes are not cumulative.
 - (a) All of the books checked out by card number 1 were returned today.
 - (b) Ford Prefect has moved to Magrathea and no longer has a phone.
 - (c) Change the book id of *Foreigner* to 10.
 - (d) Change the due date to 2006-12-31 for every book checked out from Wood Library that is due on or before 2006-11-05 and has not been returned.
 - (e) Extend the due date of every loan by one week. Use `DATE_ADD(Due_date, INTERVAL 7 DAY)` to compute the one-week-later date.
 - (f) Loan 5 was recorded with the wrong branch; it was actually checked out from Wood Library.
6. Write statements to do the following. Also report how many rows would be deleted. Treat each as an isolated task; the changes are not cumulative.
 - (a) Delete all entries from `BOOK_COPIES` where there is just one copy of a book at a branch.
 - (b) Delete *Fortress in the Eye of Time* from the database along with every record that refers to it.
 - (c) Delete all loans.