

Given the following schema :

Borrower(SId, name, age)

Copy\_Book(isbn, copy#, title, author, publisher, keywords)

Borrow(SId, isbn, copy#, date)

Write down the following queries in **relational algebra** and in **SQL** :

1. Retrieve database books.
2. Retrieve all database books borrowed by "Ahmad AlSanea"
3. Retrieve the books that were not borrowed
4. Retrieve the number of database, network, and security books

1)  $Copy\_Books$

2)  $\sigma_{name = "Ahmed AlSanea"} (Borrower) \bowtie Borrow \bowtie_{isbn = isbn} Copy\_Books$

3)  $\pi_{isbn, copy\#} (Copy\_Books) - \pi_{isbn, copy\#} (Copy\_Books \bowtie_{isbn = isbn} Borrow)$

4)  $keywords \left( \sigma_{\substack{keywords = "database" \vee \\ keywords = "network" \vee \\ keywords = "security"}} (Copy\_Books) \right)$   
 $count(*)$