EXERCISE

Consider the relational schema

BOOKS(BookTitle, Author, Category, Shelf, Copy#)

storing information about books in a library. Books have a title, an author, a position (shelf) and are subdivided into categories (poem, play, etc.). Several copies of a book can be maintained in the library.

KEY(BOOKS) = {BookTitle, Copy#}
FUNCTIONAL DEPENDENCY: BookTitle → Author, Category

BookTitle	Author	Category	Shelf	Copy#
Decameron	Boccaccio	stories	C75	01
The Divine Comedy	Dante	poem	A90	01
The Divine Comedy	Dante	poem	A90	02
Le Bourgeois Gentilhomme	Moliere	play	A90	01
Le Bourgeois Gentilhomme	Moliere	play	A22	02
Ulysses	Joyce	novel	B50	01
Richard III	Shakespeare	play	B33	01

QUESTIONS:

1. Is the schema in 3rd normal form?
2. If not, decompose it appropriately.
3. Verify whether the decomposition also satisfies the Boyce-Codd normal form.

The relation is not in 3rd normal form. The functional dependency BookTitle → Author, Category violates the conditions. We need to decompose it.

SHELVES

BookTitle	Copy#	Shelf
Decameron	01	C75
The Divine Comedy	01	A90
The Divine Comedy	02	A90
Le Bourgeois Gentilhomme	01	A90
Le Bourgeois Gentilhomme	02	A22
Ulysses	01	B50
Richard III	01	B33

Key(SHELVES) = {Booktitle, Copy#}

Functional dependency: BookTitle, Copy# → Shelf

BOOKS

BookTitle	Author	Category
Decameron	Boccaccio	stories
The Divine Comedy	Dante	poem
Le Bourgeois Gentilhomme	Moliere	play
Ulysses	Joyce	novel
Richard III	Shakespeare	play

Key(BOOKS) = {Booktitle}

Functional dependency:
Booktitle → Author, Category

NOTE:

We generate one relation (BOOKS) preserving the dependency
BookTitle → Author, Category.

The key for BOOKS is BookTitle which is also the left hand side of the functional dependency.

The other relation (SHELVES) preserves the key {BookTitle, Copy#} of the original relation BOOKS and the associated functional dependency
BookTitle, Copy# → Shelf.

Therefore the relations are in BCNF.