# COIS 3400H – Lab 10

**Problem 1:**

Consider the following universal relation that holds information about the inventory of books in a bookstore:

Books (title, isba, author, publisherName, PublisherAdd, totalCopiesOrdered, copiesInStock, publicationDate, category, sellingPrice, cost)

Assume:

* The isbn uniquely identities a book (it does not identify each copy of the book, however.)
* A book may have more than one author.
* An author may have more than one book.
* Each publisher name is unique. Each publisher has one unique address – the address of the firm’s national headquarters.
* Titles are not unique.
* totalCopiesOrdered is the number of copies of a book that the bookstore has ever ordered, while copiesInStock is the number still unsold in the bookstore.
* Each book has only one publication date. A revision of a book is given a new ISBN.
* The category may be biography, science fiction, poetry, and so on. The title alone is not sufficient to determine the category.
* The sellingPrice, which is the amount the bookstore charges for a book, is always 20 percent above the cost, which is the amount the bookstore pays the publisher or distributor for the book.

1. Using these assumptions and stating any others you need to make, list all the nontrivial functional dependencies for this relation.

**1. Non-Trivial Functional Dependencies**

1. isbn→ title,publicationDate, publisherName, category,sellingPrice,cost
2. isbn→ totalCopiesOrdered, copiesInStock
3. isbn→ PublisherAdd
4. isbn→ author (multivalued dependency due to multiple authors)
5. publisherName→ PublisherAdd
6. cost→ sellingPrice
7. title,category→ isbn
8. What are the candidate keys for this relation?

**isbn**, as it uniquely identifies all attributes in the relation.

**Isbn, author**

1. Is the relation in 3NF? If not, find a 3NF lossless join decomposition of books that preserves dependencies.

No, the relation is not in 3NF.

**Books Relation:** Books (isbn, title, publicationDate, publisherName, category, cost, totalCopiesOrdered, copiesInStock),

**Publisher Relation:** Publisher (publisherName,PublisherAdd)

**Price Relation:** Price (cost, sellingPrice)

1. Is the relation or resulting set of relations in Boyce-Codd Normal Form?

Not in BCNF (due to publisher Name → Publisher Add and cost→ selling Price).

**Decomposed Relations:**

1. Books: BCNF (All FDs involve isbn, which is a superkey).
2. Publisher: BCNF (publisher Name is a superkey).
3. Price : BCNF (cost is a superkey).