1. Information stored in a relational book:

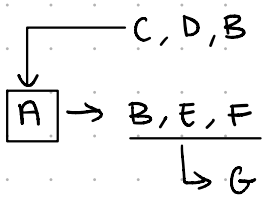
Book (CatalogNum(A), BookTitle(B), AuthorFName(C), AuthorLName(D), PublisherName(E), YearOfPublication(F), Price(G))

Dependencies exists in the relational table:

- CatalogNum(A) → BookTitle(B), PublisherName(E), YearOfPublication(F) — $A \rightarrow B,E,F$
- BookTitle(B), PublisherName(E), YearOfPublication(F) → Price(G) — $B,E,F \rightarrow G$
- AuthorFirstName(C), AuthorLastName(D), BookTitle(B) → CatalogNum(A) — $C,D,B \rightarrow A$

R = (A, B, C, D, E, F, G) FD: (A → BEF, BEF → G, BCD → A)

i)
- If A → BEF and BEF → G then thru union rule A → BEFG
- If BCD → A and A → BEFG then through augmentation rule BCD → BEFG
- If BCD → BEFG and A → BEFG then through augmentation rule ABCD → ABCDEFG
- If A → BEFG, BCD → BEFG then through augmentation rule ACD → BCDEFG [1NF]



1. If ABCD → ABCDEFG is valid in R & it covers the entire relational schema, then the LHS of FD (ABCD) is msk. //
2. If ACD → BCDEFG is valid in R & it covers the entire relational schema, then the LHS of FD (ACD) is msk. // 1NF

ii) Split to 2 relational schema:

R1 = (ACD)

ACD → BCDEFG = 1NF

The minimal super key can be (A), (C), (D)

- violates partial dependency = 1NF //

R2 = (ABCD)

ABCD → ABCDEFG = 1NF

The minimal super key can be (A), (B), (C), (D).

- violates partial dependency = 1NF //

iii) Information stored in a relational book:

BOOK (CatalogNum (A), BookTitle (B), AuthorFName (C), AuthorLName (D),
PublisherName (E), YearOfPublication (F), Price (G))

To convert to BCNF, first convert to 2NF

[A] → B, E, F R1 (CatalogNum, BookTitle, PublisherName, YearOfPublication)

CatalogNum → BookTitle, PublisherName, YearOfPublication

[B, E, F] → G R2 (BookTitle, PublisherName, YearOfPublication, Price)

BookTitle, PublisherName, YearOfPublication → Price

[C, D, B] → A R3 (AuthorFName, AuthorLName, BookTitle, CatalogNum)

AuthorFName, AuthorLName, BookTitle → CatalogNum

No partial dependency – R1, R2 & R3 is in 2NF

No transitive dependency – R1, R2 & R3 is in 3NF

Non-trival dependency – R1, R2 & R3 is in BCNF //