Megan Sin

Problem 1:
Contract-Lines(<u>LineNum</u>, <u>ContractID</u>, BookType, dueDate, PartialPayment)
Foreign key: Contract-Lines.ContractID references Contract.ContractID

Contract(<u>ContractID</u>, NumBooks, totalPayment, Date, PublisherName, AuthorID)
Foreign key: Contract.PublisherName references Publisher.name
Foreign key: Contract.AuthorID references Author.ID

Publisher(<u>name</u>, address, phone, StartYear)

Author(<u>ID</u>, address, DoB, name)

Phones(<u>AuthorID</u>, <u>phoneNum</u>)
Foreign key: Phones.AuthorID references Author.ID

Book(<u>ISBN</u>, NumPages, title, type, PublisherName, publishDate)
Foreign key: Book.PublisherName references Publisher.name

Writes(<u>ISBN</u>, <u>AuthorID</u>)
Foreign key: Writes.ISBN references Book.ISBN
Foreign key: Writes.AuthorID references Author.ID

Novel(<u>ISBN</u>, sequel)
Foreign key: Novel.ISBN references Book.ISBN

Textbook(<u>ISBN</u>, edition)
Foreign key: Textbook.ISBN references Book.ISBN

Problem 2:

Q1) $\pi_{name}\,(\sigma_{phone\,=\,\text{"1-555-444-7777"}}\,(\text{Author}))$

Q2) $\sigma_{ISBN\,=\,1112223333444}\,(\text{Book})$

Q3) $R1 \leftarrow \sigma_{date\,>=\,\text{"Jan-01-2007"}\,AND\,\,date<=\,\text{"Dec-31-2008"}\,AND\,totalPayment\,>\,100000}\,(\text{Contract})$

       $R2 \leftarrow (R1 \bowtie_{AuthorID\,=\,Author.ID} \text{Author}) \bowtie_{PublisherName\,=\,Publisher.name} \text{Publisher}$

       $Result \leftarrow \pi_{author.name,\,author.address,\,publisher.name,\,publisher.address,\,date}\,(R2)$

Q4) $\pi_{\text{PublisherName}}\left(\sigma_{\text{booksPub} > 10}\left(\gamma_{\text{publisherName, booksPub} \leftarrow \text{count(ISBN)}}(\text{Book})\right)\right)$

Q5) $\pi_{\text{NumPages}}\left(\sigma_{\text{edition} = 3}(\text{Textbook}) \bowtie \sigma_{\text{tiitle} = \text{"The Country"}}(\text{Book})\right)$

Q6) $R1 \leftarrow \gamma_{\text{ContractID, partialSum} \leftarrow \text{sum(PartialPayment)}}(\text{Contract-Lines})$

        $\text{Result} \leftarrow \pi_{\text{R1.ContractID}}\left(\sigma_{\text{totalPayment} \diamond \text{partialSum}}(R1 \bowtie \text{Contract})\right)$

Problem 3:

Q1) $R1 \leftarrow \pi_{\text{ISBN}}\left(\sigma_{\text{authorNum} = 2}\left(\gamma_{\text{ISBN, authorNum} \leftarrow \text{count(name)}}(\text{WrittenBy})\right)\right)$

        $R2 \leftarrow \pi_{\text{ISBN}}\left(\sigma_{\text{name} = \text{"Mark Smith"}}\left(R1 \bowtie_{\text{R1.ISBN} = \text{WrittenBy.ISBN}}(\text{WrittenBy})\right)\right)$

        $\text{Result} \leftarrow \pi_{\text{title, year}}(R2 \bowtie \text{Book})$

Q2) $\gamma_{\text{email, bookNum} \leftarrow \text{sum(number)}}(\text{Shopping-Basket} \bowtie \text{basketContains})$

Q3) $R1 \leftarrow \pi_{\text{name}}\left(\sigma_{\text{year} = 2010}(\text{Book} \bowtie_{\text{Book.ISBN} = \text{WrittenBy.ISBN}} \text{WrittenBy})\right)$

        $R2 \leftarrow \pi_{\text{name}}\left(\sigma_{\text{year} = 2011}(\text{Book} \bowtie_{\text{Book.ISBN} = \text{WrittenBy.ISBN}} \text{WrittenBy})\right)$

        $\text{Result} \leftarrow \delta(R1 \cap R2)$

Problem 4:

1.

V	X	B	C
1	1	2	5
1	1	2	7

2. Empty: B column domain for R and S are different

3.

A	C
3	5

4. Empty: R and S are not union compatitibe

5.

X	R.B	C	S.B	W	Z
3	4	6	β	40	3
1	2	7	α	1	7