QUESTION 2 [TOTAL MARKS: 25]

Relational Data Model

2(a) [9 Marks]

Assume the following two relations:

S	A	B
	1	0
	0	1

T	C	D
	0	0
	0	1
	1	1

Evaluate the following relational algebra expression. Give the result of each step (i.e. the result of each subexpression).

$$\mathrm{R} \;=\; \pi_D \left(\sigma_{D=1 \text{ and } A \leq D} [\mathrm{S} \bowtie_{B=C} \mathrm{T}] \right)$$

Solution:
$[\mathrm{S} \bowtie_{B=C} \mathrm{T}] \;=$

A	B	C	D
1	0	0	0
1	0	0	1
0	1	1	1

$\sigma_{D=1 \text{ and } A \leq D} [\mathrm{S} \bowtie_{B=C} \mathrm{T}] \;=$

A	B	C	D
1	0	0	1
0	1	1	1

$\mathrm{R} \;=\; \pi_D \left(\sigma_{D=1 \text{ and } A \leq D} [\mathrm{S} \bowtie_{B=C} \mathrm{T}] \right) \;=\; (D, 1, 1)^T$

Bookwork	Non-bookwork
0	9
New Question. Examines the student's grasp of Relational Algebra	

QUESTION 2 [TOTAL MARKS: 25]

Relational Data Model

2(a) [9 Marks]

Assume the following two relations:

S	A	B
	x	y
	y	x

T	C	D
	x	x
	x	y
	y	y

Evaluate the following relational algebra expression. Give the result of each step (i.e. the result of each subexpression).

$$\text{R} \;=\; \pi_D \left(\sigma_{D=y} \left[\text{S} \bowtie_{B=C} \;\text{T}\right]\right)$$

Solution:
$[\text{S} \bowtie_{B=C} \;\text{T}] \;=$

A	B	C	D
y	x	x	x
y	x	x	y
x	y	y	y

$\sigma_{D=y} [\text{S} \bowtie_{B=C} \;\text{T}] \;=$

A	B	C	D
y	x	x	y
x	y	y	y

$\text{R} \;=\; \pi_D \left(\sigma_{D=y} \left[\text{S} \bowtie_{B=C} \;\text{T}\right]\right) \;=\; (D,\text{y},\text{y})^T$

Bookwork	Non-bookwork
0	9
New Question. Examines the student's grasp of Relational Algebra	

2(b) [8 Marks]

What are the relational algebra operators? Briefly describe each of them with an example.