HW 1

Sunday, September 20, 2020 2:40 PM

R:

A	B	C
b	c	3
c	c	3
c	a	3
b	b	1
c	a	4
b	a	2

S:

A	B	C
c	c	2
c	a	3
b	b	1
a	b	3
b	c	3
a	a	1
c	c	3

T:

B	D	E	F
a	a	1	2
c	d	2	4
b	b	3	2
d	b	3	2
a	a	2	3
b	c	4	1
d	a	1	4

W:

C	D
1	a
2	b
3	c
4	d

1. $R \cap S$

R:

A	B	C	
b	c	3	✓
c	c	3	✓
c	a	3	✓
b	b	1	✓
c	a	4	✗
b	a	2	✗

S:

A	B	C	
c	c	2	✗
c	a	3	✓
b	b	1	✓
a	b	3	✗
b	c	3	✓
a	a	1	✗
c	c	3	✓

=

A	B	C
b	c	3
c	c	3
c	a	3
b	b	1

2. $S - R$

R:

A	B	C
b	c	3
c	c	3
c	a	3
b	b	1
c	a	4
b	a	2

S:

A	B	C
c	c	2
c	a	3
b	b	1
a	b	3
b	c	3
a	a	1
c	c	3

=

A	B	C
c	c	2
a	b	3
a	a	1

3. $R - S$

R:

A	B	C
b	c	3
c	c	3
c	a	3
b	b	1
c	a	4
b	a	2

S:

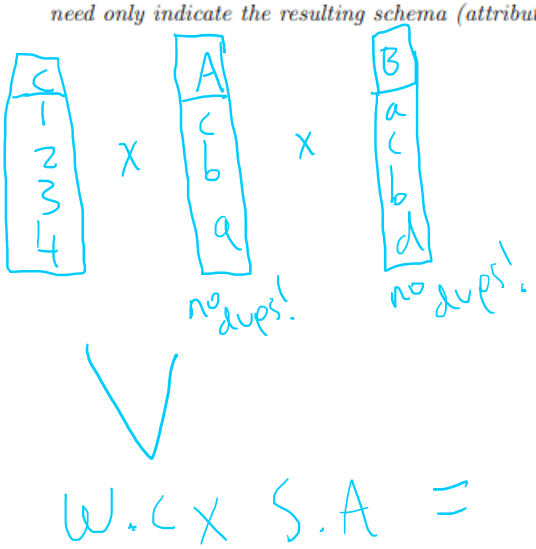
A	B	C
c	c	2
c	a	3
b	b	1
a	b	3
b	c	3
a	a	1
c	c	3

=

A	B	C
c	a	4
b	a	2

4. $\pi_C(W) \times \pi_A(S) \times \pi_B(T)$

Note: For exercise 4, you are not required to list the entire resulting relation. Your answer need only indicate the resulting schema (attribute names) and cardinality.



W.C X S.A =

1
1 c
1 B
1 a
2 c
2 B
2 a
3 c
3 B
3 a
4 a
4 B
4 c

12 total

2.

4 [1 c a
    1 c c
    1 c b
    1 c d]

4 X 12 = 48

- degree = 3
- cardinality = 48

5. $\sigma_{E>F}(T)$

T:

B	D	E	F
a	a	1	2 X
c	d	2	4 X
b	b	3	2 ✓
d	b	3	2 ✓
a	a	2	3 X
b	c	4	1 ✓
d	a	1	4 X

=

B	D	E	F
b	b	3	2
d	b	3	2
b	c	4	1

6. $\sigma_{A \neq B}(R)$

R:

	A	B	C
✓	b	c	3
X	c	c	3
✓	c	a	3
X	b	b	1
✓	c	a	4
✓	b	a	2

=

A	B	C
B	c	3
c	a	3
c	a	4
b	a	2

7. $\pi_{B,F}(\sigma_{F \geq E}(T))$

T:

B	D	E	F
a	a	1	2
c	d	2	4
b	b	3	2
d	b	3	2
a	a	2	3
b	c	4	1
d	a	1	4

=

B	F
a	2
c	4
a	3
d	4

8. $\sigma_{A=D \text{ OR } B=D}(\pi_{A,B}(R) \times W)$

R × W =

A	B	C.R	W.C	D
b	c	3	1	a
b	c	3	2	b
b	c	3	3	c
b	c	3	4	d
⋮				

=

A	B
b	c
c	c
c	a
b	b
c	a
b	a

=

A	B	C.R	W.C	D
b	c	3	3	c
c	c	3	3	c
c	a	3	1	a
b	b	3	2	b
c	a	4	1	a
b	a	2	1	a

9. $\sigma_{A=b \text{ AND } C>1}(R) \cup \sigma_{B=b \text{ OR } C \neq 3}(S)$

R:

A	B	C
b	c	3
c	c	3
c	a	3
b	b	1
c	a	4
b	a	2

=

A	B	C
b	c	3
b	a	2

S:

A	B	C
c	c	2
c	a	3
b	b	1
a	b	3
b	c	3
a	a	1
c	c	3

=

A	B	C
c	c	2
b	b	1
a	b	3
a	a	1

=

R		S		
A	B	C	A	B	C
b	c	3	c	c	2
b	c	3	b	b	1
b	c	3	a	b	3
b	c	3	a	a	1
b	a	2	c	c	2
b	a	2	b	b	1
b	a	2	a	b	3
b	a	2	a	a	1

10. $\sigma_{NOT(B=d)}(T)$

T:

B
a
c
b
d

=

B	D	E	F
a	a	1	2
c	d	2	4
b	b	3	2

a	
c	
b	
d	
a	
b	
d	

=

c	a	2	4
b	b	3	2
a	a	2	3
b	c	4	1

11. $\pi_{A,B,R.C,D}(\sigma_{R.C=W.C}(R \times W))$

A	B	R.C	W.C	D
b	c	3	1	a
b	c	3	2	b
b	c	3	3	c ✓
b	c	3	4	d
c	c	3	1	a
c	c	3	2	b
c	c	3	3	c ✓
c	c	3	4	d
c	a	3	1	a
c	a	3	2	b
c	a	3	3	c ✓
c	a	3	4	d
b	b	1	1	a ✓
b	b	1	2	b
b	b	1	3	c
b	b	1	4	d
c	a	4	1	a
c	a	4	2	b
c	a	4	3	c
c	a	4	4	d ✓
b	a	2	1	a
b	a	2	2	b ✓
b	a	2	3	c
b	a	2	4	d

=

A	B	R.C	D
b	c	3	c
c	c	3	c
c	a	3	c
b	b	1	a
c	a	4	d
b	a	2	b

12. $W \bowtie R$

W:

C	D
1	a
2	b
3	c
4	d

R:

A	B	C
b	c	3
c	c	3
c	a	3
b	b	1
c	a	4
b	a	2

=

C	D	A	B
1	a	b	b
2	b	b	a
3	c	b	c
3	c	c	c
3	c	c	a
4	d	c	a

13. $W \bowtie_{R.C=W.C} R$ =

C	D	A	B
1	a	b	b
2	b	b	a
3	c	b	c
3	c	c	c
3	c	c	a
4	d	c	a

14. $T \bowtie_{F>C} W$

T:

B	D	E	F
a	a	1	2
c	d	2	4
b	b	3	2
d	b	3	2
a	a	2	3
b	c	4	1
d	a	1	4

W:

C	D
1	a
2	b
3	c
4	d

=

B	D	T	E	F	C	D	W
a	a	1	2	1	a		
c	d	2	4	1	a		
c	d	2	4	2	b		
c	d	2	4	3	c		
b	b	3	2	1	a		
d	b	3	2	1	a		
a	a	2	3	1	a		
a	a	2	3	2	b		
d	a	1	4	1	a		
d	a	1	4	2	b		
d	a	1	4	3	c		

15. $R \bowtie S$

R:

A	B	C
b	c	3
c	c	3
c	a	3
b	b	1
c	a	4
b	a	2

S:

A	B	C
c	c	2
c	a	3
b	b	1
a	b	3
b	c	3
a	a	1
c	c	3

=

A	B	C
b	c	3
c	c	3
c	a	3
b	b	1

16. $R \bowtie_{R.B=S.A} S$

R:

A	B	C
b	c	3
c	c	3
c	a	3
b	b	1
c	a	4
b	a	2

S:

A	B	C
c	c	2
c	a	3
b	b	1
a	b	3
b	c	3
a	a	1
c	c	3

=

A	B	C
c	c	3
b	b	1

17. $\pi_{T1.D,T2.B}(\rho_{T1}(T) \bowtie_{T1.D=T2.B} \rho_{T2}(T))$

Main Main

T:

B	D	E	F
a	a	1	2
c	d	2	4
b	b	3	2
d	b	3	2
a	a	2	3
b	c	4	1
d	a	1	4

=

D	B
a	a

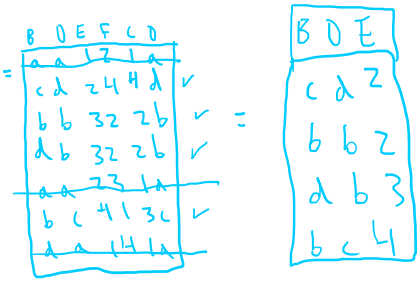
18. $\pi_{B,D,E}(\sigma_{F \leq C}(T \bowtie W))$

T:

B	D	E	F
a	a	1	2
c	d	2	4
b	b	3	2
d	b	3	2
a	a	2	3
b	c	4	1
d	a	1	4

W:

C	D
1	a
2	b
3	c
4	d



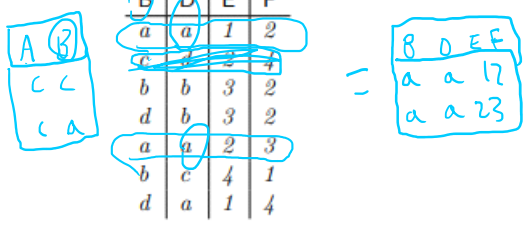
19. $\pi_{R.A,R.B}(R \bowtie_{R.C \neq S.C} S) \bowtie \sigma_{D=a}(T)$

R:

A	B	C
b	c	3
c	c	3
c	a	3
b	b	1
c	a	4
b	a	2

S:

A	B	C
c	c	2
c	a	3
b	b	1
a	b	3
b	c	3
a	a	1
c	c	3



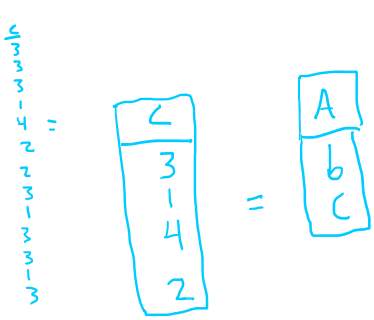
20. $\pi_A(\pi_B(\pi_C(R \cup S)))$

R:

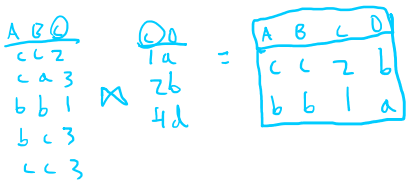
A	B	C
b	c	3
c	c	3
c	a	3
b	b	1
c	a	4
b	a	2

S:

A	B	C
c	c	2
c	a	3
b	b	1
a	b	3
b	c	3
a	a	1
c	c	3



21. $\sigma_{A \neq a}(S) \bowtie \sigma_{D \neq c}(W)$



22. $\sigma_{C=1}(R) \bowtie \sigma_{C=2}(S)$

R:

A	B	C
b	c	3
c	c	3
c	a	3
b	b	1
c	a	4
b	a	2

S:

A	B	C
c	c	2
c	a	3
b	b	1
a	b	3
b	c	3
a	a	1
c	c	3

23. $\pi_{C,A}(S) - \rho_{W(C,A)}(W)$

S:

A	B	C

W:

C	D

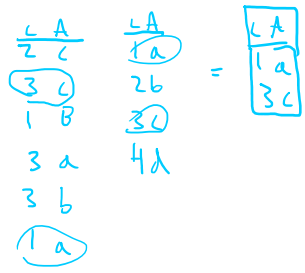
23. $\pi_{C,A}(S) - \rho_{W(C,A)}(W)$

S:

A	B	C
c	c	2
c	a	3
b	b	1
a	b	3
b	c	3
a	a	1
c	c	3

W:

C	D
1	a
2	b
3	c
4	d



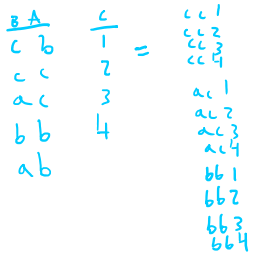
24. $\pi_{B,A}(R) \bowtie \pi_C(W)$

R:

A	B	C
b	c	3
c	c	3
c	a	3
b	b	1
c	a	4
b	a	2

W:

C	D
1	a
2	b
3	c
4	d



25. $\pi_F(T) \times \rho_{F2}(\pi_F(T))$

T:

B	D	E	F
a	a	1	2
c	d	2	4
b	b	3	2
d	b	3	2
a	a	2	3
b	c	4	1
d	a	1	4