# HW<sub>1</sub>

Sunday, September 20, 2020 2:40 PM

R:		
Α	В	C
b	c	3
$\boldsymbol{c}$	c	3
c	a	3
b	b	1
$\boldsymbol{c}$	a	4
b	a	2

S:		
Α	В	С
c	c	2
c	a	3
b	b	1
a	b	3
b	c	3
a	a	1
c	c	3

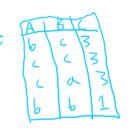
T:			
В	D	Ε	F
a	a	1	2
c	d	2	4
b	b	3	2
d	b	3	2
a	a	2	3
b	c	4	1
d	a	1	4

W:	
С	D
1	a
2	b
3	c
4	d

## 1. $R \cap S$

R:			
Α	В	C	
b	c	3	▽
c	c	3	V ,
c	a	3	V
b	b	1	/
c	a	4	χ
$\boldsymbol{b}$	a	2	χ

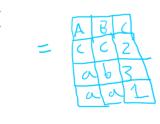
S:		
Α	В	С
c	c	2 X -
c	a	3
b	b	1 /
a	b	$3 \times$
b	c	3 V
$\boldsymbol{a}$	a	1 X
c	c	3



## $2.\ S-R$

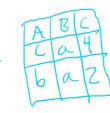
R:		
Α	В	C
b	c	3
c	c	3
c	a	3
b	$\boldsymbol{b}$	1
c	a	4
b	a	2

S:		
Α	В	С
c	c	2
c	a	3
$\boldsymbol{b}$	b	1
$\boldsymbol{a}$	b	3
$\boldsymbol{b}$	c	3
a	a	1
c	c	3



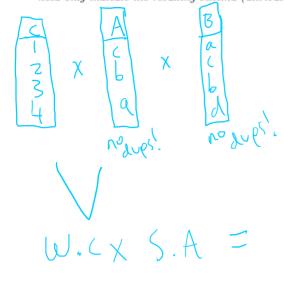
## 3. R-S

R:		
Α	В	C
b	c	3
c	c	3
c	a	3
b	$\boldsymbol{b}$	1
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.



12 total

D ( B & ( B & ( 7

4 a 4 b 4 c

4 X 17 = 42

• Degree = 3

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

T:				
В	D	Е	F	1 '
a	a	1	2X	
c	d	2	4 X _	1
b	b	3	2 1	
d	b	3	2 V	T
a	a	2	3 X	
b	c	4	1 🗸	
d	a	1	4 X	Ų

	B	D	E	F	
	6	6	3	2	1
-	1	16	3	2	1
	T <sub>E</sub>	C	14		7

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

	R:				Т	-1	P	(
	Α	В	C			A	6	_
V	b	c	3	-	- /	B	6	3
χ	c	c	3				[	7
V	c	a	3			(	la	3
X	b	b	1			-	1	L
V	c	a	4			1	10	-
V	b	a	2			P	a	
						ا		

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

T:				
B	D	E	(F)	18/7
a	a	1	2 V	12
c	d	2	4 V	1
b	b	3	2 x =	1 41
d	b	3	2 X	12
a	a	2	3 V	12/
$\boldsymbol{b}$	c	4	1 X	1214
d	a	1	4 1/	

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

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

	•			
R:				
Α	В	C		A B
$\frac{b}{c}$	c	3		, ,
c	c	3		P C 3
c	a	3		١.,-
b	6	4		60
$\frac{c}{b}$	a	4 2		
b	a	2	R	T 5 L
-	_		6 6 6 7 6 AZ 6 AZ 6 AZ	AR (

S:				
Α	В	С		A B C
c	c	2		7
c	a	3	-	ارركا
b	b	1	_	\\
$\boldsymbol{a}$	$\frac{b}{c}$	3		1 6 6 1 1
$\boldsymbol{b}$	c	3		1 0 1 2
a	$\begin{vmatrix} a \\ c \end{vmatrix}$	1		(0,63)
c	c	3		\aal/
				000

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

<u>T:</u>	B	b	E	F
B	a	a	1	2
c	1	2	2	14-
$\boldsymbol{b}$	1	١	T3	7
d	שן	9	45	7 7

a -	1			
c	1	d	2	4
<i>b</i>	<u> </u>	7	3	7
d		1	2	3
a b	10		4	
d	16			لــُـــا
·				

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

,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	//				
Al Black and D	A	В	R.(	0	_
6 2 3 26 6 2 3 3 CV =	6	۷	3	(	Ī
	L	(	3	(	1
در ۶ ۱۵ در ۶ عل	1	a	3	(	Į
(() 3()	Ь	Ь		0	
د د څ لا کم	(	a	4	1	
caz ab	6	a	2	6	
(a) 3( )  (a) 41    b  1   a   V      b  1   2b      b  1   41  (a4   1a    (a4   2b    (a4   2b    (a4   41    (a4   2b    (a4   41    (a					

12.  $W\bowtie R$ 

W: -	R:		CID A B
C D	Α	В	
1 a	b	c	7 7 b b x
	c	c	3 3 ( ) (
$\begin{bmatrix} 2 & b \\ 3 & c \end{bmatrix}$	c	a	3 3666
	b	b	1 3 ( (a)
4   d	c	$\boldsymbol{a}$	14 / Lul
	$\boldsymbol{b}$	a	2
			CIO A B
13. $W \bowtie_{R.C=W}$	c F	2 -	
TO: W FAR.C=W	.0 -	-	2 b b a
			2 / 1 (
			3 ( 6 (
			3 6 6 6
			3 ( ( )
			4 1 ( a)

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

T:			
В	D	Е	F
a	a	1	2
c	d	2	4
$\boldsymbol{b}$	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			
	'			

BOJEFICION TOA 21A
= (2414
cd24 26
cd 24 3 c
1 66 37 1a 1
a a z 3 la
aa 23 2 b
dalfla
da (426
da 1430

#### 15. $R \bowtie S$

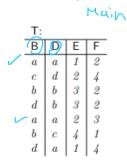
R:		
Α	В	С
b	c	3
c	c	3
c	a	3
b	b	1
c	a	4
b	a	2

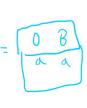


## 16. $R \bowtie_{R.B=S.A} S$

R:		
Α	B	C
b	c	3
c	c	3
c	a	3
$\boldsymbol{b}$	b	1
c	a	4
$\boldsymbol{b}$	a	2

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





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

T:			
В	D	Е	E
a	a	1	2
c	$\frac{a}{d}$	2	4
$\boldsymbol{b}$	b	3	2
d	b	3	2
a	a	2	2 3
b	c	4	1
d	a	1	4

W:	B O E F ( D c d 2 4 4 d V b b 32 2 b V = d b ( 4 1 3 c V	BOE ( & Z 6 6 Z 8 6 3
	da (HIA)	b c -1

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

R:	_	
A	В	C)
b	c	3
c	c	3
c	a	3
$\boldsymbol{b}$	b	1
c	a	4
$\boldsymbol{b}$	a	2

S: 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  b b 3 2  d b 3 2  d b 3 2  d b 4 1  d a 1 4	- 8 D EF a a 17 a a 23
---	--	------------------------------

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

R:		
Α	В	C
b	c	3
c	$\boldsymbol{c}$	3
c	a	3
$\boldsymbol{b}$	b	1
c	a	4
$\boldsymbol{b}$	a	2

S:						
Α	В	С	. <u> </u>			
c	c	2	: 3 			
c	a	3	Ĺ			I A L
b	b	1	4 =			1
a	b	3	7	\ 3		161
b	c	3	3		=	101
a	a	1	۱ ر	\		
c	c	3	3	1 1		
			1	\ 2\		

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

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

	R:		
	Α	В	С
	b	c	3
	c	c	3
	c	a	3
(	b	b	1
	c	a	4
	$\boldsymbol{b}$	a	2

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

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

S:			W:	, Δ	LA	/ A
Α	В	С	CD	7 (	ta	
c	c	2	1 a	30	26	=
	a	3	$2 \mid b$	i B	7	52
$\boldsymbol{b}$	b	1	$3 \mid c$	, ,	<u>30</u>	
c b a b	b	3	4   d	3 L	ዛ ኤ	
$\boldsymbol{b}$	c	3		3 4		
a	a	1				
c	c	3				

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

2	24. π	$_{B,A}($	$R) \bowtie \pi_C(W)$			( b l ( b z ( b 3 ( b 14
R:			W:	в 🚣	۷	661
Α	В	C	CD	C 16	T =	C L Z
b	c	3	1 a	ے ر	7	دد ۲
c	c	3		0(	3	هر ا
c	a	3	$\begin{bmatrix} 2 & b \\ 3 & c \end{bmatrix}$	b b	4	al ? al }
$\boldsymbol{b}$	b	1	4 d	ab	•	414
c	a	4	4   4	0, 6		bb 1
b	a	2				662
	1					664 664
25.	$\pi_F(T)$	r) ×	$\rho_{F2}(\pi_F(T))$			مها
T:						م اوی ماوی
В	DT	FΤ	F			مه۲

1:							
В	D	Е	F				
a	a	1	2			C n	
c	d	2	4	专		F2-4	d
$\boldsymbol{b}$	b	3	2	4	χ	4	= 9
d	b	3	2	ĺ		3	
$\boldsymbol{a}$	a	2	3				
b	c	4	1				
d	$egin{array}{c} a \\ d \\ b \\ b \\ a \\ c \\ a \end{array}$	1	4				