CSE 132A Written HW#2

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①

(i) Construct Pattern according to Query:

R	A	B	C	D
x		△		
y		△	o	
z		5	O	□

*Select z.D from R where conditions are met.

answer	D
a	□

Query: SELECT z.D
FROM Rx, Ry, Rz
WHERE y.C = o AND x.B = y.B
AND z.B = 5 AND z.C = y.C

(ii) Minimize pattern in (i), satisfying FD's: A → D, CD → B, C → A

R	A	B	C	D
x	–	△	–	–
y	–	△	o	–
z	–	5	O	□

using C→A ⇒

R	A	B	C	D
x	–	△	–	–
y	a	△	o	–
z	a	5	O	□

A → D ⇒

R	A	B	C	D
x	–	△	–	–
y	a	△	o	□
z	a	5	O	□

CD→B ⇒

R	A	B	C	D
x	–	5	–	–
~~y~~	~~a~~	~~5~~	~~O~~	~~□~~
z	a	5	O	□

*x.B changes to 5 as well due to the fact that x.B = y.B

↳ Here we can minimize by ridding of y, due to duplicates
↳ row x can match z

R	A	B	C	D
~~x~~	~~a~~	~~5~~	~~O~~	~~□~~
z	a	5	O	□

⇒ can cancel due to duplicate.

answer	A	B	C	D
a	a	5	O	□

(iii) Query for minimized pattern.

SELECT z.D
FROM R z
Where z.B = 5 AND z.C = 0

②

R	A	B	C	D	E	G

$F = \{E \to D,\ C \to B,\ CBE \to AG,\ B \to A,\ G \to E\}$

(i) Find all keys in R, a key contains all attributes in R.

→ Since C doesn't exist in RHS, it must appear in every key.
if we do CE^+ we get CBEAGD
CG^+ we get CBEAGD as well.
keys

(ii) keys = CE & CG, so we find BCNF Decomp wrt F.

R(A B C D E G)
→ R_1(E, D)
→ R_2(A B C E G)
→ → R_3(B, A)
→ → R_4(B C E G)
→ → → R_5(G, E)
→ → → R_6(B C G)
→ → → → R_7(C, B)
→ → → → R_8(C, G)

E → D
B → A
G → E
C → B

(iii) No, this decomposition is not dependency preserving as I decomposed the relation...
I never utilized FD: $CBE \to AG$ in order to split. Therefore it is not preserved wrt F...

(iv) Find a 3NF decomp of R w/ lossless join & dependency preservation wrt F. Is it also in BCNF?

First step: must simplify FD's, must eliminate redundancies.
$\{E \to D, C \to B, CBE \to AG, B \to A, G \to E\}$

$CBE \to A$
$CBE \to G$ → we can simplify by eliminating.
→ Since $B \to A$, we see that C + E in $CBE \to AG$ is redundant.

Then we are left with $CBE \to G$

so $F_{\text{w/o redundancies}} = \{E \to D, C \to B, CBE \to G, B \to A, G \to E\}$

R = ABCDEG   Keys = CE, CG → add it to P

*except for CE since CBE already consists of CE.

A	B	C	D	E	G
			d	e	
a	b	c			
a	b	c	d	e	g
a	b				
			d	e	g
a	b	c	d	e	g

P = {ED, CB, CBEG, BA, GE, CG}

must chase w/ F.
→ $\{E \to D,$
$C \to B,$
$CBE \to G,$
$B \to A,$
$G \to E\}$ in order

various of steps.

as you can see...
the end result is the added key CG filled with each attribute.
→ proves that preservation w/ 3NF holds.

The decomposition is not in BCNF since CBE violates BCNF.