

HW 5 CS334

1. Coviddata (country, country_properties, data, data_properties)
 $\Rightarrow R = \{C, CR, D, DR\}$
 $F = \{C \rightarrow CR, D \rightarrow DR\}$

The functional dependencies do not span the whole range of the relation, so NOT BCNF

2. tripadvisor (restaurant_name, restaurant_rank, score, user_name, review_star, review_date, user_reviews, user_restaurant_reviews, user_helpful_votes)
 $\Rightarrow R = \{N, R, S, U, T, D, V, W, H\}$
 $F = \{N \rightarrow RTD, R \rightarrow SUVWH\}$

The functional dependencies do not span the whole range of the relation, so NOT BCNF.

3. select if(count(*) > 0, 'No', 'Yes')
from tripadvisordata t1, tripadvisordata t2
where t1.user_name = t2.user_reviews
and t1.user_name <> t2.user_reviews

Output: Yes

5. $R = \{A, B, C, D, E, G, H, K\}$

$F = \{ABK \rightarrow C, A \rightarrow DG, B \rightarrow K, K \rightarrow AH, H \rightarrow GE\}$

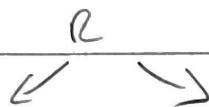
$ABK^+ = \{A, B, C, D, E, G, H, K\}$

$A^+ = \{A, D, G\}$

$B^+ = \{A, B, D, E, G, H, K\}$

$K^+ = \{A, D, E, G, H, K\}$

$H^+ = \{H, G, E\}$



$R_1(A, D, G)$

$R_2(A, B, C, E, H, K)$

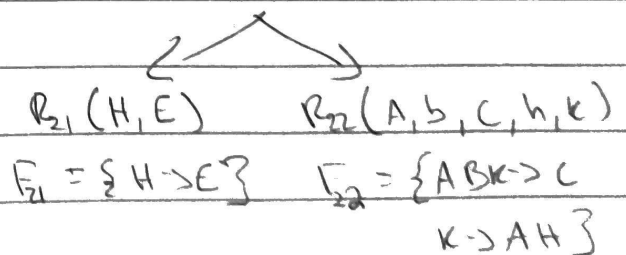
$F_1 = \{A \rightarrow DG\}$

$F_2 = \{ABK \rightarrow C, B \rightarrow K, H \rightarrow GE\}$

It is not in BCNF

BCNF dependencies:

$F = \{ABK \rightarrow C, A \rightarrow DG, H \rightarrow E, K \rightarrow AH, B \rightarrow KC\}$



$R_{21}(H, E)$

$R_{22}(A, B, C, H, K)$

$F_{21} = \{H \rightarrow E\}$

$F_{22} = \{ABK \rightarrow C, K \rightarrow AH\}$

$R_{221}(K, H, A)$

$R_{222}(B, C, K)$

$F_{221} = \{K \rightarrow AH\}$

$F_{222} = \{C \rightarrow KC\}$

BCNF:

$R_1(ADG)$

$R_{21}(HE)$

$R_{221}(KHA)$

$R_{222}(BCK)$

6 $R_1 \{A, C, D, E\}$ $R_2 \{B, F, G, E\}$ $R_3 \{E, F\}$

a.

	A	B	C	D	E	F	G
R_1	a_1	b_1	c_1	d_1	e_1	f_1	g_1
R_2	a_2	b_2	c_2	d_2	e_2	f_2	g_2
R_3	a_3	b_3	c_3	d_3	e_3	f_3	g_3

R_1 is lossless as all placeholders
now contains actual values.

b $R \{A, B, C, D, E, F, G\}$

$A^+ = \{A, C, D\}$ ABE

$B^+ = \{B, F, G\}$

$E^+ = \{E, F, G\}$

$ABE^+ = \{A, B, C, D, E, F, G\}$

ABE is a key for this scheme

7 $R = \{ABCEG\}$

$F = \{AB \rightarrow D, AB \rightarrow C, AC \rightarrow E, B \rightarrow D, CE \rightarrow A, E \rightarrow G\}$

$R_1 = \{ABD\}$ $R_2 = \{ACE\}$ $R_3 = \{ADEG\}$

	A	B	C	D	E	G
$R_1 = ABD$	a_1^a	b_1^b	c_1^c	d_1^d	e_1^e	g_1^g
$R_2 = ACE$	a_2^a	b_2^b	c_2^c	d_2^d	e_2^e	g_2^g
$R_3 = ADEG$	a_3^a	b_3^b	c_3^c	d_3^d	e_3^e	g_3^g

1st tuple, R_1 , must be +; placeholders replaced with actual values \therefore lossless

8. $R = \{ABCD\}$

$F = \{A \rightarrow B, C \rightarrow D, BC \rightarrow A\}$

$R_1 = \{AB\}$ $R_2 = \{AC\}$ $R_3 = \{BCD\}$

	A	B	C	D
$R_1 = AB$	a_1^a	b_1^b	c_1^c	d_1^d
$R_2 = AC$	a_2^a	b_2^b	c_2^c	d_2^d
$R_3 = BCD$	a_3^a	b_3^b	c_3^c	d_3^d

R_2 and R_3 are both tuples +; their placeholders replaced with actual values \therefore lossless

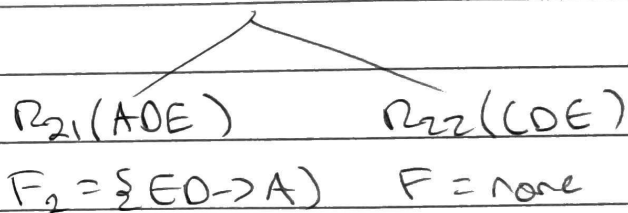
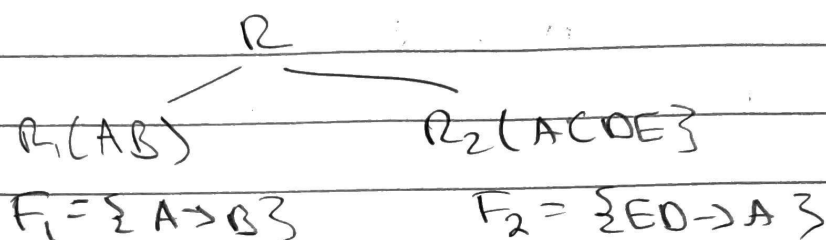
Q. $R = \{A B C D E\}$

$F = \{A \rightarrow B, BC \rightarrow E, ED \rightarrow A\}$

$A^+ = \{A B\}$

$BC^+ = \{B C E\}$

$ED^+ = \{A B D E\}$



BCNF:

$R_1(AB) \quad F_1 = \{A \rightarrow B\}$

$R_{21}(ADE) \quad F_2 = \{ED \rightarrow A\}$

$R_{22}(CDE) \quad F = \text{none}$

10. $R = \{ ABCDEFGH \}$

$F = \{ AB \rightarrow E, C \rightarrow D, D \rightarrow E, FG \rightarrow A \}$

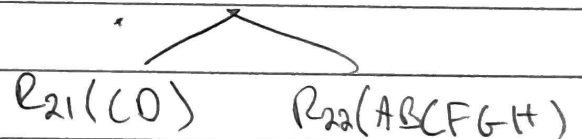
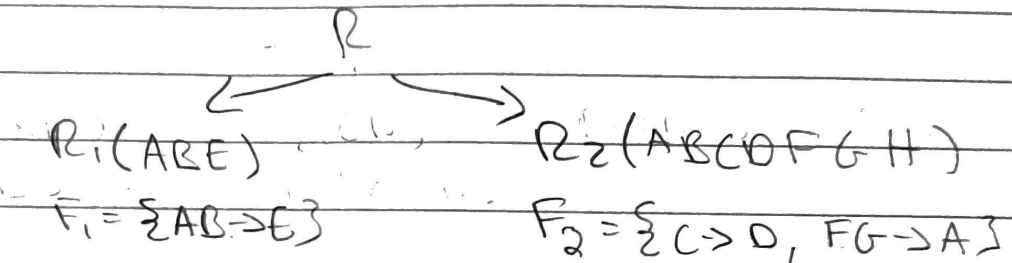
$AB^+ = \{ ABC \}$

$C^+ = \{ CDE \}$

$D^+ = \{ DE \}$

$FG^+ = \{ AFG \}$

$BCFGH^+ = \{ ABCDEFGH \}$



$F_1 = \{ C \rightarrow D \}$ $F_2 = \{ FG \rightarrow A \}$

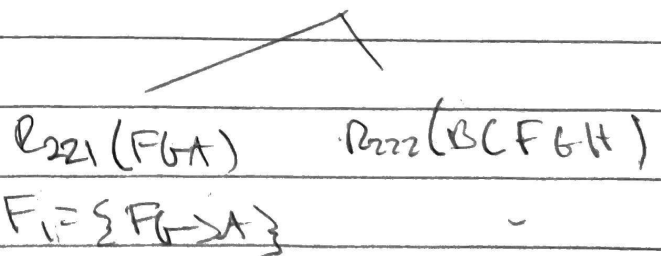
decomposed:

$R_1(ABE)$

$R_{21}(CD)$

$R_{221}(FGA)$

$R_{222}(BCFGH)$



10.

	A	B	C	D	E	F	G	H
R_1	a_1^a	b_1^b	c_1	d_1	e_1^e	f_1	g_1	h_1
R_2	a_2	b_2	c_2^c	d_2^d	e_2^e	f_2	g_2	h_2
R_{221}	a_3^a	b_3	c_3	d_3	e_3	f_3^f	g_3^g	h_3
R_{222}	a_4^a	b_4^b	c_4^c	d_4^d	e_4^e	f_4^f	g_4^g	h_4^h

R_{222} is tuple + that no longer has placeholders and is replaced with actual values, therefore it is lossless