1.

1.) SEMANTICS OF THE ATTRIBUTES
2.) REDUCING THE REDUNDANT VALUES IN TUPLES
3.) REDUCING THE NULL VALUES IN TUPLES
4.) DISALLOWING THE POSSIBILITY OF GENERATING SPURIOUS TUPLES

1.) SEMANTICS OF THE ATTRIBUTES: EASILY EXPLAINED, IN OTHERWORDS THE ENTITY IS STRAIGHTFORWARD. DO NOT COMBINE ATTRIBUTES FROM MULTIPLE ENTITIES AND ATTRIBUTE TYPES INTO A SINGLE RELATION.

2.) DESIGN THE DATABASE SCHEMA SO THAT NO INSERTION, DELETION, OR MODIFICATION ANOMALIES ARE PRESENT

3.) AVOID PLACING ATTRIBUTES IN A RELATION WHERE THE VALUES MAY FREQUENTLY BE NULL.

4.) DISALLOW A TABLE DECOMPOSITION WHERE INSERTION, DELETION, & MODIFICATION ANOMALIES MIGHT OCCUR.

[redacted]

#2 Using our IR for FD's prove that

Given $\{A \to EB, B \to C, C \to D\} \models ZA \to ZD$

By IR 5

$A \to EB$

$A \to E$

$A \to B$,

We have

$A \to B$, $B \to C$

So, $\underline{A \to C}$ By IR 3

Similarly

$A \to C$, $C \to D$

So $\underline{A \to D}$ By IR 3

$A \to D$

$ZA \to ZD$ By IR 2 //

proved //

#10 Briefly describe the database application system life cycle.

Database application system includes the following

- → System Definition
- → Database Design
- → Database Implementation
- → Loading or Data conversion
- → Application conversion
- → Testing and validation
- → Operation
- → Monitoring and maintenance.

FINAL PRACTICE

3) $EA^+ = EA$

$= EAB$

$= EABC$

$= EABCD$

$EA^+ = \{E, A, B, C, D\}$

$F = \{A \to B$

$AB \to C$

$EC \to D\}$

9) in 4NF but not in 5NF

$ABC \to D$

$R(ABCD)$

ABC is the superkey

$JD(BC, CD, BD)$

Not in 5NF: none of them are superkeys

4

$F = \{A \to BC, AC \to D, A \to D\}$

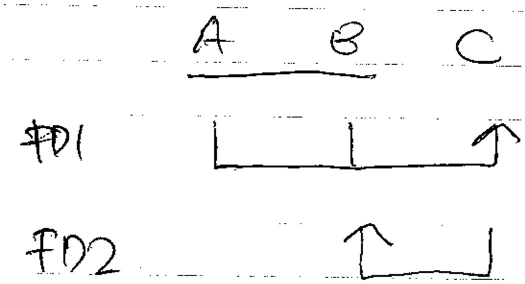
will be split into two rules by Step 1 of min cover algorithm

C will be deleted in step 2 of algorithm

whole rule will be deleted in step 3

(5) $R = \{A, B, C\}$

$FD1 = AB \to C$
$FD2 = C \to B$



It's in 3NF because to be in 3NF, the non trivial FD $X \to A$ has to have either (a) X is a superkey OR (b) A is a prime attribute and in $FD1 = AB \to C$ (AB is a superkey)
$FD2 = C \to B$ (B is prime)

and not in BCNF b/c only requirement (a) is fulfilled because FD2 is not in BCNF, 6\.

Dependency - preserving property:

A decomposition $D = \{R1, R2, \ldots, Rm\}$ of R is dependent preserving with respect to F if the Union of the Projections of F ~~if the Union~~ on each R_i in D is equivalent to F.

Lossless join property of a decomposition:

A decomposition $D = \{R1, R2, \ldots, Rm\}$ of R has the lossless join property with respect F on R if, for every relation state r of R that satisfies F, the following holds

$$*(\pi_{R1}(r), \ldots, \pi_{Rm}(r)) = r$$

Dependency Preserving Example

$R = \{A, B, C, D, E\}$

$F = \{A \to BC,\ B \to DE\}$

Preserved

$R_1 = \{A, B, C\}$ $R_2 = \{B, D, E\}$

Preserved because all FDs on R are explicitly present

Not preserved

$R_1 = \{A, B, C, D\}$ $R_2 = \{D, E\}$

$B \to DE$ is not preserved

$F^+ = \{A \to BC,\ B \to DE,\ B \to D,\ B \to E,\ A \to DEC\}$

$(F_{R_1} \cup F_{R_2})^+ = F^+$

F_{R_1}: $A \to BC$, $B \to D$

F_{R_2}: None. D and E are never on LHS of a FD

$(A \to BC,\ B \to D)^+ \neq F^+$

lossless Join Preserving

$R = \{A\ B\ C\ D\ E\ F\}$

$F = \{A \to B,\ C \to DE,\ AC \to F\}$

Not preserving

$R_1 = \{B, E\}$ $R_2 = \{A, C, D, E, F\}$

	A	B	C	D	E	F
R_1		a_2			a_5	
R_2	a_1	b_{22}	a_3	a_4	a_5	a_6

After applying f.d's last row Not all a's

Preserving

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

	A	B	C	D	E	F
R_1	a_1	a_2				
R_2			a_3	a_4	a_5	
R_3	a_1	~~b_{32}~~ a_2	a_3	a_4	a_5	a_6

$A \to B$ $C \to DE$

Last row all a's

7)

1) minimal cover = $\{AB \to C,\ C \to D,\ D \to B\}$

2) $\boxed{\underline{AB} \mid C}$ $\boxed{\underline{C} \mid D}$ $\boxed{\underline{D} \mid B}$

3) Find key = ABE → $\boxed{\underline{A \mid B \mid E}}$

let Kold = $\{A\ B\ C\ D\ E\}$

let K = $\{B\ C\ D\ E\}$

K+ = R? NO

~~kold~~ let K = Kold

let K = $\{A\ \cancel{B}\ C\ D\ E\}$

K+ = R? NO

let K = Kold

let K = $\{A\ B\ D\ E\}$

K+ = R? yes

let Kold = K

let K = $\{A\ B\ E\}$

K+ = R? yes

let Kold = K

let K = $\{A\ B\}$

K+ = R? NO

let K = Kold

K = ABE

8 R (A B C D)

$ABC \to D$

$A \twoheadrightarrow BC$

It is in BCNF but not in 4NF because A is not a superkey