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HW-5

1) a, c, e and f

2)
a) $R_1(A, B)$ and $R_2(A, C)$ their intersect is A
also $A \rightarrow AB$ and AB equals to R_1 that's why it is lossless.

b) $R_1(A, B)$ and $R_2(B, C)$ their intersect is B
also $B \rightarrow B$, because of these $B \rightarrow R_1$ is not true
$B \rightarrow R_2$ is // //

A	B	C
1	4	6
2	4	7
3	5	8

R_1:

A	B
1	4
2	4
3	5

R_2:

B	C
4	6
4	7
5	8

$R_1 \bowtie R_2$:

A	B	C
1	4	6
1	4	7
2	4	6
2	4	7
3	5	8

not lossless.

3) $A \rightarrow D$, $BC \rightarrow E$, $D \rightarrow AB$

a) Candidate key should contain C as C does not show up on right side of the equations.

candidate keys: $[CA]^+ \rightarrow CADBE$
$[CD]^+ \rightarrow CDABE$

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3-b) A is not a superkey and $A \to D$ is not trivial that is a violation, so R is not in BCNF

3-c) Not in 3NF.

$BC \to E \Rightarrow BC$ is not a super-key, E is not in candidate keys.

4)

a) $[D]^+ = ABCDE$ which covers $D \to AC$ $D \to E$ connections.

$A \to B$ and $A \to C$ because $A \to BC$

$AB \to BC$ covers $AB \to C$

that's why G covers F.

b) $E \to B$ dependency is not covered so F cannot cover G.

c) they are not equivalent as G covers F but F cannot cover G.

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