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Assignment #6

Part 1:
F = {
I → K,
AI → BLG,
IC → ADE,
BIG → CJ,
K → HA,
}
R = {
ABCDEGHIJKL
}

1) a)

1.	$I \rightarrow K$	Given
2.	$K \rightarrow HA$	Given
3.	$I \rightarrow HA$	Transitivity 1 ; 2
4.	$AI \rightarrow HA$	Augmentation 3
5.	$AI \rightarrow H$	Decomposition 4

$\therefore F \models AI \rightarrow H$ □

b)

A	B	C	D	E	L	G	H	I	J	K

r = {

Answer: In set F, the only functional dependency that determines attribute K is I → K. This means I must be determined to determine K; however no attributes ever determine I according to set F. This means $ABCDELGHJ^+_F$ does not include attribute I in its closure which means K is also not in the closure; attributes AC are in this closure though. Therefore, $F \not\models AC \rightarrow K$

c) $BIC^+_F = \{ABCDEGHIJKL\}$

BIC^+_F: $BIC \overset{1}{\Rightarrow} BCIK \overset{5}{\Rightarrow} ABCHIK \overset{2}{\Rightarrow} ABCGHIKL \overset{3}{\Rightarrow} ABCDEGHIKL \overset{4}{\Rightarrow} ABCDEGHIJKL$

d) $K+ = \{I\}$ Is I the only candidate key: $I \overset{1}{\Rightarrow} IK \overset{5}{\Rightarrow} AHIK \overset{2}{\Rightarrow} ABGHIKL \overset{4}{\Rightarrow} ABCGHIJKL \overset{3}{\Rightarrow} ABCDEGHIJKL$

$K- = \{DEHJL\}$

$K? = \{ABCGK\}$

Answer: I is the only candidate key of R

Part 2:
$F = \{$
$A \to B$
$BD \to H$
$E \to D$
$C \to AE$
$\}$
$R = \{$
$ABCDEH$
$\}$

2) a)
1. $A \to B$ Given
2. $BD \to H$ Given
3. $AD \to H$ Pseudo-transitivity 1 & 2
4. $ADC \to H$ Augmentation 3

$\therefore F \vDash ADC \to H$ □

b) $BE^+_F = \{BDEH\}$

BE^+_F: $BE \overset{3}{\Rightarrow} BDE \overset{2}{\Rightarrow} BDEH$

c) $K = \{C\}$
$K- = \{H\}$
$K? = \{ABD\}$

Is C the only candidate key:
$C \overset{4}{\Rightarrow} ACE \overset{1}{\Rightarrow} ABCE \overset{3}{\Rightarrow} ABCDE \overset{2}{\Rightarrow} ABCDEH$

Answer: C is the only candidate key of R