

CSE 462 Classwork #6: Relational Design

Name: _____

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***** Solved in class. *****

1. Consider the relation schema $R(A, B, C, D, E, F)$ and a set of FDs $\mathcal{F} = \{A \rightarrow C, AB \rightarrow D, BC \rightarrow E, F \rightarrow B\}$ that hold in R . A designer suggests decomposing R into relation schemas with attribute sets: $S_1 = \{A, C, D, F\}$, $S_2 = \{A, B, F\}$, and $S_3 = \{B, C, E\}$. Apply the chase to test whether this decomposition has the lossless join property. Show the steps of the chase in the space provided indicating, for each iteration, the FD you applied.

Setup:

A	B	C	D	E	F

Iteration #1: _____

A	B	C	D	E	F

Iteration #2: _____

A	B	C	D	E	F

Iteration #3: _____

A	B	C	D	E	F

Iteration #4: _____

A	B	C	D	E	F

Iteration #5: _____

A	B	C	D	E	F

2. Consider the relation schema $R(A, B, C, D, E, F)$ and a set of FDs and MVDs $\mathcal{F} = \{A \twoheadrightarrow BC, B \rightarrow D, C \rightarrow F\}$ that hold in R . Apply the chase to test whether the MVD $A \twoheadrightarrow E$ hold in R . Show the steps of the chase in the space provided indicating, for each iteration, the FD or MVD you applied.

Setup:

A	B	C	D	E	F

Iteration #1: _____

A	B	C	D	E	F

Iteration #2: _____

A	B	C	D	E	F

Iteration #3: _____

A	B	C	D	E	F

Iteration #4: _____

A	B	C	D	E	F

Iteration #5: _____

A	B	C	D	E	F

3. Consider the relation schema $R(A, B, C, D, E)$ and the instance of R shown below.

A	B	C	D	E
a	b ₁	c ₁	d ₁	e
a ₁	b	c ₁	d ₁	e
a ₁	b ₁	c	d ₁	e
a ₁	b ₁	c ₁	d	e

a) Identify all non-trivial FDs that hold for the instance of R above. Assume that any FD that you can infer from this instance holds for all instances of R .

b) Use the set of FDs computed above to determine the key(s) of R . Show all necessary attribute set closures to justify your answer.

c) How many superkeys does R have? Show all necessary steps of the computation.