CS 775/875 Quiz 9 4/7/2021 Name _____

1. Consider the relation R(a,b,c,d) with functional dependencies:

   $a \rightarrow bc, b \rightarrow a$

   Which of the following are BCNF decompositions of R?

   (a) R1(a,b,d), R2(a,c)
   (b) R1(a,b,d), R2(b,c)
   (c) R1(a,b,c), R2(b,d)
   (d) all decompositions are correct.

2. (2.5) Consider the relation R(a,b,c,d,E) with functional dependencies:

   $d \rightarrow c, aE \rightarrow d, d \rightarrow a, cE \rightarrow a$.

   What relations would be produced by the BCNF decomposition algorithm?

   (a) R1(a,b,c,d,E)
   (b) R1(a,b,c), R2(b,d,E)
   (c) R1(a,c,d), R2(b,d,E)
   (d) R1(a,d,E), R2(a,b,c,E)

3. (2.5) Consider the relation instance of R(a,b,c).

a	**b**	**c**
$a1$	$b1$	$c1$
$a1$	$b2$	$c2$
$a1$	$b1$	$c2$
$a2$	$b1$	$c3$
$a2$	$b1$	$c1$

   Which of the following MVDs hold for this instance of R?

   (a) A $\twoheadrightarrow$ B YES NO

   (b) B $\twoheadrightarrow$ C YES NO

   (c) A $\twoheadrightarrow$ C YES NO

   (d) C $\twoheadrightarrow$ B YES NO

4. (2.5) Consider relation R(A, B, C, D, E). Suppose R contains the tuples (a, b, c, d, e) and (a, 2, c, 4, 5). How many more tuples must be added so that R satisfies MVD A $\twoheadrightarrow$ B and FD: B $\twoheadrightarrow$ D.

   (a) 2
   (b) 4
   (c) 6
   (d) 8