ICS 321 Data Storage \& Retrieval - Ex\#5 Name:
Armstrong's Axioms and rules for splitting and combining.

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\begin{array}{rlll}
X \subseteq Y & \Rightarrow Y \rightarrow X \quad \text { (Reflexivity) } \\
X \rightarrow Y & \Rightarrow X Z \rightarrow Y Z \quad \forall Z \quad \text { (Augmentation) } \\
X \rightarrow Y \wedge Y \rightarrow Z & \Rightarrow X \rightarrow Z \quad \text { (Transitivity) } \\
X \rightarrow Y \wedge X \rightarrow Z & \Rightarrow X \rightarrow Y Z \quad \text { (Combining) } \\
X \rightarrow Y Z & \Rightarrow X \rightarrow Y \wedge X \rightarrow Z \quad \text { (Splitting) }
\end{array}
$$

Consider the relation $R(A, B, C, D)$. For each of the following sets of FDs,
(1) $C \rightarrow D, C \rightarrow A, B \rightarrow C$
(2) $B \rightarrow C, D \rightarrow A$
(3) $A B C \rightarrow D, D \rightarrow A$
(4) $A \rightarrow B, B C \rightarrow D, A \rightarrow C$
(5) $A B \rightarrow C, A B \rightarrow D, C \rightarrow A, D \rightarrow B$
assuming those are the only dependencies that hold for $R$, do the following:
(a) Identify the candidate $\operatorname{key}(\mathrm{s})$ for $R$.
(b) Identify the best normal form (3NF or BCNF) that $R$ satisfies.
(c) If $R$ is not in BCNF, decompose it into a set of BCNF relations.

