Quiz 2 Answers, Fall 2018
CSCI 4380 Database Systems

Question (Points: (a) 7, (b) 8, (c-d) 10). You are given the following relation:
$R(A, B, C, D, E, F)$, $\mathcal{F} = \{AB \rightarrow CDE, AE \rightarrow BF, F \rightarrow B\}$

(a) List all keys.

Answer. AB, AE, AF

(b) Is it in BCNF? Is it in 3NF? Explain why or why not by discussing whether each functional dependency satisfies BCNF or 3NF conditions.

Answer. Is it not in BCNF because $F \rightarrow B$ does not have a superkey on the left.

It is in 3NF because AB, AE are superkeys for the first two functional dependencies and B is a primary attribute for the last functional dependency.

(c) Convert to BCNF using BCNF decomposition if it is not already in BCNF.

Answer. Given $F \rightarrow B$ violates BCNF, we can decompose using this functional dependency.

$R1(B, F)$, $\{F \rightarrow B\}$, Key: B, in BCNF

$R2(A, C, D, E, F)$, $\{AE \rightarrow CDF, AF \rightarrow CDE\}$, Keys: AE, AF, in BCNF.

(d) Convert to 3NF using 3NF decomposition if it is not already in 3NF.

Answer. Already in 3NF.