

Database Systems, CSCI 4380-01  
Homework # 3  
Due Monday September 23, 2019 at 11:59:59 PM

**Homework Statement.** This homework is worth 1.5% of your total grade. If you choose to skip it, Midterm #1 will be worth 1.5% more. Remember, practice is extremely important to do well in this class. I recommend that not only you solve this homework, but also work on homeworks from past semesters. Link to those is provided in the Piazza resources page.

This homework is for practicing Normalization.

**Question 1.** You are given relation  $R(A, B, C, D, E, F, G, H)$  and set  $\mathcal{F}$  of functional dependencies:

$$\mathcal{F} = \{AB \rightarrow CD, BD \rightarrow EF, DE \rightarrow GH, G \rightarrow B\}$$

Use the BCNF decomposition to find relations that satisfy the BCNF normal form.

In your decomposition, use the functional dependency  $BD \rightarrow EF$  first. For each decomposed relation, find the projection of the functional dependencies for that relation.

If the resulting relations are not in BCNF, continue with BCNF decomposition using  $G \rightarrow B$ .

If the resulting relations are not in BCNF, continue with BCNF decomposition using any other functional dependency that you desire.

Finally, after you complete the decomposition, check if the resulting decomposition is dependency preserving. Show your work.

**Question 2.** You are given relation  $R(A, B, C, D, E, F, G, H)$  and set  $\mathcal{F}$  of functional dependencies  $\mathcal{F} = \{AB \rightarrow CDE, C \rightarrow A, BE \rightarrow CG\}$ .

Use the 3NF decomposition to find relations that satisfy the 3NF normal form. For each resulting relation, list all functional dependencies that hold for that relation and show if it is also in BCNF or not.

**SUBMISSION INSTRUCTIONS.** Submit a PDF document for this homework using Gradescope. No other format and no hand written homeworks please. No late submissions will be allowed.

If the gradescope for homework submissions is not immediately available, we will announce it on Piazza when it becomes available.