

## BMEG3120: Exercise List 9

Consider the set  $F$  of following functional dependencies<sup>1</sup> on relation  $R(ABCD)$ :

$$\begin{aligned}AB &\rightarrow C \\AB &\rightarrow D \\C &\rightarrow A \\D &\rightarrow B\end{aligned}$$

Answer the following questions.

**Problem 1.** Is  $R$  in BCNF?

**Problem 2.** Is the decomposition of  $R$  into  $R_1(ABD)$  and  $R_2(AC)$  lossless?

**Problem 3.** Decompose  $R$  into BCNF tables.

**Problem 4\*\*.** Prove that  $R$  does not have any BCNF decomposition that is dependency preserving.

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<sup>1</sup>These dependences were taken from Exercise 19.7 in the reference book of this course.