BMEG3120: Exercise List 9

Consider the set $F$ of following functional dependencies$^1$ on relation $R(ABCD)$:

\[
\begin{align*}
AB & \rightarrow C \\
AB & \rightarrow D \\
C & \rightarrow A \\
D & \rightarrow B
\end{align*}
\]

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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$^1$These dependences were taken from Exercise 19.7 in the reference book of this course.