This exercise addresses relational design theory.

Consider a database with relations \textbf{Students}(id, name, year), \textbf{Courses}(id, title, ta), and \textbf{Enrolls}(student, course, credits). A tuple \((i, n, y)\) \(\in\) \textbf{Students} denotes a student with student-identifier \(i\), name \(n\), and year \(y\). A tuple \((i, t, a)\) \(\in\) \textbf{Courses} denotes a course with course-identifier \(i\), title \(t\), and whose teaching assistant’s student-identifier is \(a\). A tuple \((s, c, r)\) \(\in\) \textbf{Enrolls} denotes the enrollment of the student with identifier \(s\) in the class with identifier \(c\), for \(r\) credits.

1. List the members of your group below. Underline your name.

2. Provide the smallest possible instance of the \textbf{Students} relation that \textit{violates} the functional dependency \(id \rightarrow name, year\).

3. Provide the smallest possible instance of the \textbf{Courses} relation that \textit{violates} both the functional dependencies \(id \rightarrow title\) and \(ta, title \rightarrow id\).
4. Provide simple English descriptions of the dependencies in Questions 2 and 3.

5. List all superkeys and all keys of Courses, given the dependencies in Question 3.

6. Compute \{title\}^+ and \{id, ta\}^+ given the dependencies of Question 3.
7. Consider $R(A, B, C, D, E)$ with dependencies

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

List all keys of $R$

8. Project the dependencies of Question 7 onto the relation $R'(A, B, C)$. 

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9. Decompose $R$ as necessary to generate a BCNF schema.