Advanced Databases - Exercise Sheet No. 2

Third Year of the "Computer Engineering" Program

Exercise I

Consider the relation in 1NF given by:
R(U={A,B,C,D,E}, F={AC → BE, BC → A, ABC → D}).

1. Show that R is in Second Normal Form (2NF).
2. Determine whether R is in Third Normal Form (3NF).

Exercise II

You are given the following relation CourseRegistration:

StudentID	StudentName	CourseID	CourseName	Instructor	InstructorEmail	Semester	Grade
1001	Sara	CS101	Databases	Dr. Haji	haji@uir.edu	Fall2025	19
1002	Amine	CS101	Databases	Dr. Haji	haji@uir.edu	Fall2025	17
1001	Sara	CS102	AI	Dr. Gadi	gadi@uir.edu	Fall2025	16
1003	Nour	CS102	AI	Dr. Gadi	gadi@uir.edu	Fall2025	18

With Functional Dependencies (FDs):

- StudentID → StudentName
- CourseID → CourseName, Instructor, InstructorEmail
- CourseID, StudentID, Semester → Grade

1. Check if CourseRegistration is in 1NF.
2. Identify the candidate key(s).
3. Check if CourseRegistration is in 2NF. If not, decompose the relation into tables that satisfy 2NF.
4. Check if your 2NF tables are in 3NF.