Homework 4 (70 Points)

Q1) (40 Points) Consider the ER diagram below, representing a simple database for a university. Translate this ER diagram into SQL commands (i.e., create table statements). Your SQL code needs to integrate all constraints specified in the ER diagram (i.e., it must be impossible to insert data violating any constraint). Also, the number of SQL tables created should be minimal under the aforementioned constraint.
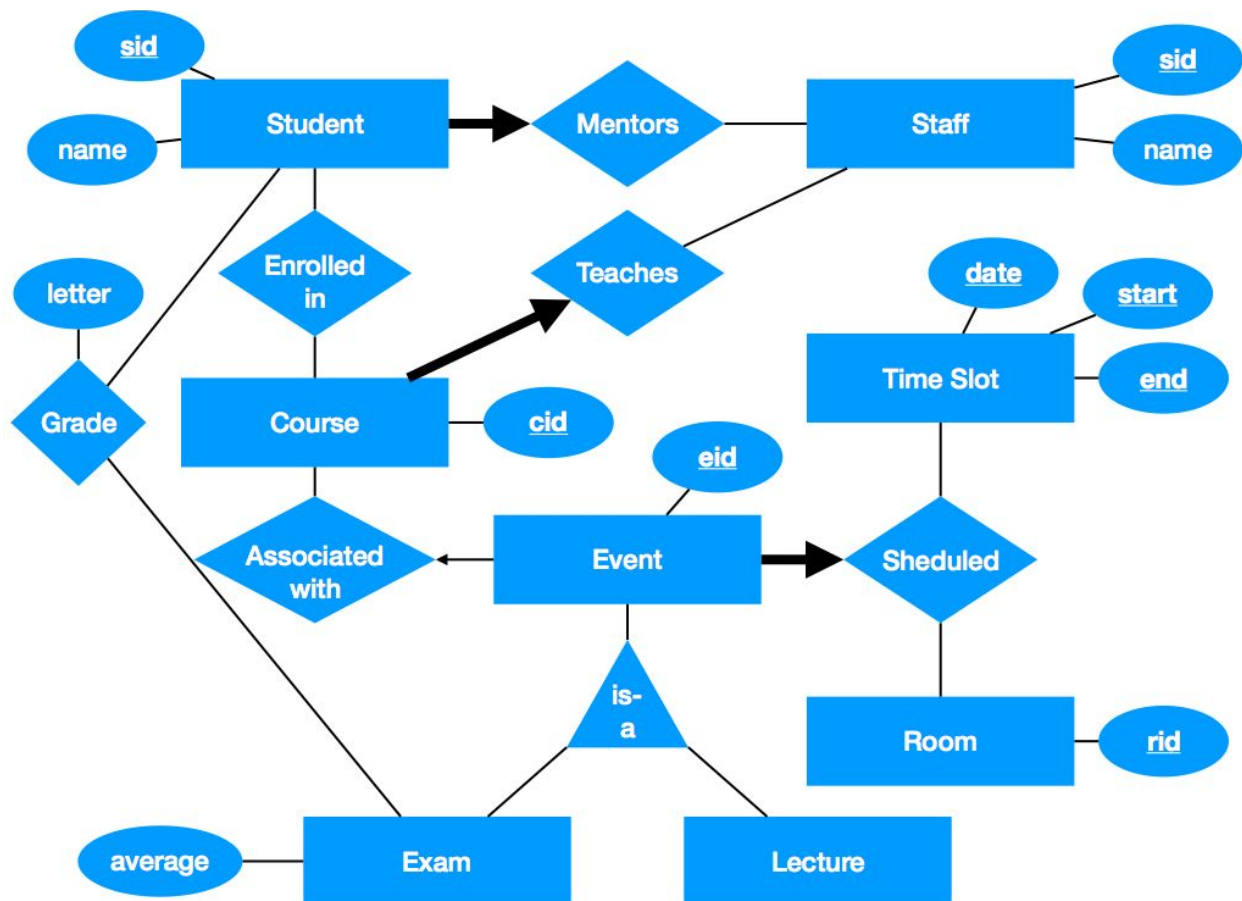
Q2) (10 Points) Consider the set of functional dependencies F={A→B, BD→E, B→D, DE→C}. Does it imply the functional dependency A→C ?

Q3) (10 Points) Consider the relation R with attributes A, B, and C. Given the functional dependencies F={A→B, B→A, A→C}, determine the set of all keys for R.

Q4) (10 Points) Consider the relation R with attributes A, B, C, D, and E, E is a key for R. Given the functional dependencies F={C→D, AB→E, E→B}, decompose R to achieve BCNF. Outline each decomposition step. Justify that your result is indeed in BCNF by validating each functional dependency against the BCNF conditions.