CS482/502 Database Management Systems I

Assignment: Theory of Database Design

a. (40%) Consider a relation schema R(A,B,C,D,E) that satisfies the set of functional dependencies F = {BC $\rightarrow$ D, D $\rightarrow$ E, A $\rightarrow$ C, B $\rightarrow$ C}.

   (i) (10%) Calculate $(AB)^+$.

   (ii) (10%) Is BC$\rightarrow$ E in F^+? Please justify. (Justification carries 5%.)

   (iii) (20%) Find all the candidate keys of R, and show your steps to find them. (Steps carry 10%)

b. (20%) Consider a relation schema R(A,B,C,D,E) that satisfies the set of functional dependencies F = {AB $\rightarrow$ D, E $\rightarrow$ C}.

   1. (10%) Is R in BCNF? Please justify your answer. (Justification carries 8%.)
   2. (10%) Is R in 3NF? Please justify your answer. (Justification carries 8%.)

c. (30%) Consider a relation schema R(A,B,C,D) that satisfies the set of functional dependencies F = {A $\rightarrow$ B, BC $\rightarrow$ D}.

   1. (15%) Find all the candidate keys of R. (No steps are needed)
   2. (15%) Is R in 3NF? Please justify your answer. (Justification carries 12%.)

d. (10%) For the relation schema *Player* (refer to the SQL/relational algebra homework), assume that ID is the primary key and no Player's names are the same (i.e., a Players's name can uniquely identify a Player).

   1. (5%) Please write down all the non-trivial functional dependencies that hold in the schema *Player*.
   2. (5%) Please state all the candidate keys of the schema *Player*.