COM S 461: ASSIGNMENT 1

Percentage in your final grade: 6%
Maximum score for this assignment: 60 points

Objectives:

1. Exercise your understanding of functional dependencies and normalization

Questions:

1. (20 points): Suppose that we have the following three tuples in a legal instance of a relation schema S with three attributes ABC (listed in order): (1, 2, 3), (4, 2, 3), and (5, 3, 3).

    - Which of the following dependencies can you infer does not hold over schema S?
      $A \rightarrow B$, $BC \rightarrow A$, $B \rightarrow C$
    - Can you identify any dependencies that hold over S?

2. (20 points): Consider the attribute set R={A, B, C, D, E, G} with the set of dependencies F = {$AB \rightarrow C$, $AC \rightarrow B$, $AD \rightarrow E$, $B \rightarrow D$, $BC \rightarrow A$, $E \rightarrow G$}. Answer the following questions (you must explain why):

    - Is D1 = {ABC, ACDE, ADG} a lossless join decomposition?
    - Is D1 a dependency-preserving decomposition?
    - What is the strongest normal form of ABC and why?

3. (20 points): Consider a relation R with the attribute set {A, B, C, D, E, F, G, H, I, J} and a corresponding set of functional dependencies F = {$AB \rightarrow C$, $A \rightarrow DE$, $B \rightarrow F$, $F \rightarrow GH$, $D \rightarrow IJ$}. Given the following decomposition:

    D2 = {R1, R2, R3, R4, R5}
    R1 = {A, B, C, D}
    R2 = {D, E}
    R3 = {B, F}
    R4 = {F, G, H}
    R5 = {D, I, J}

    - Is D2 a dependency-preserving decomposition? Why?
    - Is D2 a lossless-join decomposition? Why?

Submission Requirements:

1. Put your answers in a Word document, and email it to the TA and cc to the instructor.