Problem Set 1
CS 4600: Database Theory and Applications

Out: Week of 01/27/2014
Due: The beginning of the class in the week of 02/03/2014

*Solutions should be in a **typed-up** format by using LaTeX or microsoft word. Remember, your goal is to communicate. Full credit will be given **only** to the correct solution which is described clearly. Convoluted and obtuse descriptions might receive low marks, even when they are correct. Also, aim for concise solutions, as it will save you time spent on write-ups, and also help you conceptualize the key idea of the problem.*

Problem 1: Superkeys (24 pt)
Suppose we have a relation that has 7 attributes, let us name them A, B, …, and G respectively. Please consider the following scenarios:

(a) We only have A as the only attribute that can uniquely identify the record in the table. What is the size of super key?
(b) We have two attributes, A and B, that can identify the record, respectively.
(c) We have a combination of two attributes that can identify the record uniquely

(I) What is the size of super key for the above three situations?
(II) Draw the venn diagram to to show the relationship between superkey, candidate keys for the above three situations. Fill the diagram with the set of keys your derived in (I).

Problem 2: Invalid keys (2+2+1=5pt)
Let us define invalid key as the set of possible attributes that cannot uniquely identify the record. Same as problem 1, please list all the combination in this set.

Problem 3: Do Problem **2.9 (6+4pt)**

Problem 4: Do Problem **2.11 (6pt)**

Problem 5: Do Problem **2.13 (15pt)**

Problem 6: SQL Query **(15pt)**

Find the ID of minimal salary person in the department of "CS" by use of Instructor table listed in figure 1.2 in the textbook with the following constraints:

      (a) Without using the aggregate function (min)

            a-1. Use except

            a-2. Use Not-In

      (b) Use the aggregate function (min)

Problem 7: Do Problem 3.16 **(15pt)**

Problem 8: Do Problem 3.24 **(10pt)**