CS579
Homework Assignment 5

Due: 11/14

Problem 1 (10 points). Consider the following relations instance:

A	B	C	D
10	b1	c1	d1
10	b2	c2	d2
11	b4	c1	d3
14	b3	c4	d4
13	b1	c1	d5
14	b3	c4	d6

For each of the following functional dependencies, indicate whether the functional dependency *may hold* or *cannot hold*. If a functional dependency cannot hold, explain why.

(a). A → B
(b). B → C
(c). B → A
(d). C → A
(e). D → B

Problem 2 (10 points). Consider a universal relation R = {A, B, C, D, E, F, G, H, I, J}. {A, B} is the primary key and there are four additional functional dependencies specified on R: fd1: {A} → {F}, fd2: {B} → {H, I}, fd3: {E} → {J}, and fd4: {C} → {D}. Normalize R to 2NF first and then to 3NF. For each step, show the normalized RDB schema and indicate all primary keys and foreign keys. Use the original definitions of 2NF and 3NF.

Problem 3 (10 points). Consider a relation R = {A, B, C, D, E, F, G, H, I, J}. {A, B,C} is the primary key of R and {G, H} is an alternate key (or a candidate key). There are five additional functional dependencies specified on it: fd1 = {A} → {D}, fd2 = {A,B} → {E}, fd3 = {F} → {G}, fd4 = {G} → {J}, fd5 = {C} → {H}. Normalize R into first 3NF and then to BCNF. Use the general definition of 3NF. At each step, show the normalized RDB schema and indicate all primary keys and foreign keys.

Name your submission file *LastName_FirstName_Hw5.doc* or *LastName_FirstName_Hw5.pdf*, and submit it on Blackboard.