Course: CS204- DATABASE SYSTEMS   Time Allowed: *90 min.*
Date: *16 April, 2014*
Max Points:

SECTION(CS-A, B, C, D)
Midterm 2

Section: _____   Name: _____   Roll No: _____

Question 1*(5 points)*

Consider the relation R(A, B, C, D, E, F, G, H), with FDs {$BC \rightarrow AD$, $E \rightarrow F$, $F \rightarrow GH$}.
a. Find all the keys for this relation R. (you don't need to list super keys that are not keys.)
b. Identify the best normal form that R satisfies (1NF, 2NF, 3NF, or BCNF). Justify your answer.
c. If R is not in BCNF, decompose it into a set of BCNF relations.

Question 2 *(5 points)*

Consider the relation R(X, Y, Z, W), with FDs { $XY \rightarrow Z$, $XY \rightarrow W$, $Z \rightarrow X$, $W \rightarrow Y$ }.
a. Find all the keys for this relation R. (you don't need to list super keys that are not keys.)
b. Identify the best normal form that R satisfies (1NF, 2NF, 3NF, or BCNF). Justify your answer.
c. If R is not in BCNF, decompose it into a set of BCNF relations.

Question 3 *(points)*

Given the following relation instance.
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X  Y  Z
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1  4  2
1  5  3
1  6  3
3  2  2
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Which of the following functional dependencies are satisfied by the instance?
(a) XY -> Z and Z -> Y   (b) YZ -> X and Y -> Z
(c) YZ -> X and X -> Z   (d) XZ -> Y and Y -> X

Question 4 *(points)*

Consider a relation scheme R = (A, B, C, D, E, H) on which the following functional dependencies hold: {A–>B, BC–>D, E–>C, D–>A}. What are the candidate keys of R?

Question 5 *(points)*

Consider two sets of functional dependencies for a given Relation R = (A, B, C, D, E, F)

F = { A → C, AC → D, E → AD, E → F }
G = { A → CD, E → AF }

Is F equivalent to G?

Question 6 *(points)*

Find a minimal cover for the following set of functional dependencies:
Relation R = (A, B, C, D, E, F)

F = { A → C, AC → D, E → AD, E → F }

Question 7 *(points)*

Consider the following (incomplete) schedule *S*:
R1(X), R1(Y), W1(X), R2(Y), W3(Y), W1(X), R2(Y)

Can you determine the serializability graph for this schedule? Assuming that all three transactions eventually commit, show the serializability graph.

Question 8 *(points)*

Determine whether each schedule is strict, cascadeless, recoverable, or nonrecoverable. Determine the strictest recoverability condition that each schedule satisfies and show your working.

S1: R1(X), R1(Y), W1(X), R2(Y), W3(Y), a3,W1(X), R2(Y), c1, c2
S2: R1(X), R1(Y), W1(X), R2(Y), W3(Y), a3,W1(X), R2(Y), c1, a2
S3: R1(X), R1(Y), W1(X), R2(Y), W3(Y), c3,W1(X), R2(Y), c1, a2
S4: R1(X), R1(Y), W1(X), R2(Y), W3(Y), W1(X), R2(Y), c1, c3,a2