CS 589: Quiz 2, 13 October 2008 Name:_____KEY_____

No books or notes. Work individually.

FD inference axioms:

F1. X → X
F2. If X → Y, then XZ → YZ
F3. If X → Y and X → Z, then X → YZ
F4. If X → YZ, then X → Y
F5. If X → Y and Y → Z, then X → Z
F6. If X → Y and YZ → W, then XZ → W

Question 1 (16 points): Consider relation scheme R = Q D C N R P T. (You might think of it as Quarter, Departments, Course number, Course Name, Room, Professor, Time.) Given the FDs F = {DC → N, DN → C, QDCT → RP, P → D, QRT → DC}, for each of the FDs below, **circle** the FD if it is implied by F, **cross out** the FD if it is not implied by F.
Probably the easiest way to do these is to compute the closure of the left side and see if the right side is in it.

QRT → D O
(QRT)+ = QDCNRPT
PC → CN O
(PC)+ = DCNP
DN → T X
(DN)+ = DCN
QRT → N O
(QRT)+ = QDCNRPT

QT → DT X
(QT)+ = QT
QDCT → N O
(QDCT)+ = QDCNRPT
QDNT → CP O
(QDNT)+ = QDCNRPT
CNR → NR O
(CNR)+ = CNR

Question 2: Consider the two implications below (A, B and C are individual attributes):
I. A → BC implies AB → C
II. AB → C implies A → BC

a. (3 points) Which is the correct implication?
I
b. (6 points) Prove the correct implication from F1 – F6.
Step 1. A → BC (Given)
Step 2. AB → BC (From Step 1 by F2)
Step 3. AB → C (From Step 2 by F4)

c. (5 points) Give a counter-example to the incorrect implication.

A	B	C
1	2	3
1	4	5