The University of British Columbia
Computer Science 304

Midterm Examination
February 8, 2010

Time: 50 minutes   Total marks: 50

Instructor: Rachel Pottinger

Name_____Student No_____

(PRINT)   (Last)   (First)

Signature_____

This examination has 6 pages.

Check that you have a complete paper.

This is a closed book, closed notes exam. No books or other material may be used.

Answer all the questions on this paper.

Give very **short but precise** answers.

State any assumptions you make

Work fast and do the easy questions first. Leave some time to review your exam at the end.

Question	Mark	Out of
1		7
2		18
3		10
4		15

Good Luck

1.   {7 marks} Consider the schema R(A, B, C, D, E, F, G, H, I) together with the functional dependencies: A→B, C→D. Assume that R1(A,B,C,D,E) is a relation obtained through decomposition of R. Is R1 in BCNF? Why or why not? If not, decompose into a collection of BCNF relations using the method we used in class and the book and *circle the relations in your final answer*. *Show all your work.*

2. {18 marks} Consider the schema S(A, B, C, D, E) together with the functional dependencies:
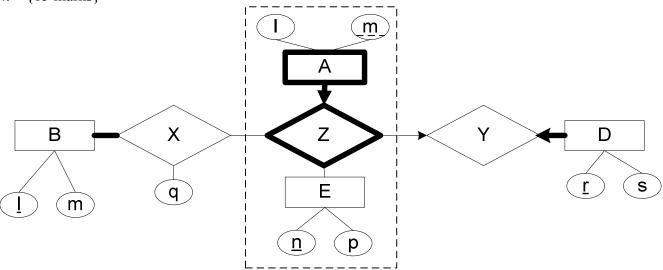
BD → A
AB→ C
D→ A
B→ C
C→E

Is S in 3NF? Why or why not? If not, decompose into 3NF using the method we used in class and the book and *circle all relations in your final answer. Show all your work.*

3. {10 marks} Create an ER diagram for the following specification:

- A bank has a database with accounts.
- For each account it records the (unique) account number and the current balance.
- There are two types of accounts: chequing and savings. Savings accounts have an interest rate. Chequing accounts have a monthly fee.
- The database also has information about depositors — their name, (unique) social-insurance number, and a single address.
- The bank stores, for each account, the depositor or depositors (in the case of joint accounts), that own the account.
- Each account must have at least one depositor.

4. {15 marks}

Transform the ER diagram into a relational schema using the methods discussed in class/the book. State
any assumptions that you make – but your assumptions cannot contradict the facts given.
   a. {12 marks} Give the SQL DDL necessary to create the relational schema.   You do *not* have to
       include types for any attributes

   b. {3 marks} Are there any constraints in the relational schema that cannot be modeled without
       using assertions? If so, which constraint(s)? If not, why not?

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