

Signature _____ Seat Row _____

CSE-305 First Midterm Exam – Spring 2001 Section _____

Name _____ ID# _____

Answer all questions. This test is closed-book, closed-notes. Write your answers on this paper. Check to see that you have 6 numbered exam pages and 4 problems. Raise your hand if you have any question.

1. (40 pts) Professor David would like to assign m projects to n students in a database class. Each project can be described by its name, description, deadline and status (completed or in progress); each student has a student id, a name, and an email. Students can work in groups of several persons on one of the m projects. Different groups will take different projects (assume more projects than students, so some projects will have no students assigned) and each student participates in exactly one group. After the project for a group is finished, a grade for the project is determined and given to all students in the group. Assume each group is identified by a unique group name. In the following, you are asked to help David design a database system to facilitate the assignment and grading of the projects,
 - (a) (20 pts) Draw an E-R diagram for the system, in particular, use arrows or thick lines to represent constraints appropriately. Write down your assumptions if necessary.

- (b) (15 pts) Translate the above E-R diagram to a relational model, in particular, specify your primary key and foreign key constraints clearly.

(c) (5 pts) Write an SQL statement to create a view of project name and group name of completed projects.

2. (5 pts) Define primary key, candidate key and superkey. Is a superkey always a key? Explain.

3. (5 pts) Calculate the Cartesian product (also known as *cross product*) of the following two table instances.

A	B
a1	b1
a2	b2
a3	b3

C	D
c1	d1
c2	d2

4. (50 pts) For a simple BBS (Bulletin Board System) we use the following SQL statements to create two tables, one storing all posted messages, and the other for users who can post them.

```
CREATE TABLE Messages(  
    mesgid INTEGER,  
    poster INTEGER,  
    subject VARCHAR(50),  
    body    VARCHAR(255),  
    postdate DATETIME,  
    PRIMARY KEY mesgid,  
    FOREIGN KEY poster REFERENCES Users(userid)  
    ON DELETE CASCADE  
    ON UPDATE CASCADE  
)
```

```
CREATE TABLE Users(  
    userid VARCHAR(50),  
    password VARCHAR(50),  
    email VARCHAR(50),  
    status CHAR(1),  
    PRIMARY KEY(userid)  
)
```

- (a) (10 pts) There is an error in one of the above statements. Point out the error, explain why it is wrong and correct the error by rewriting that SQL statement.

- (b) (10 pts) Suppose there is a user with userid John in the database who

have posted 100 messages. What will the DBMS do if we delete John from table Users? What if we change John's userid to Michael?

(c) (5 pts) Write an SQL statement to create a view of those messages with all their attributes that are posted by 'John'.

(d) (5 pts) Write an SQL statement to create a domain such that the status attribute can only take two values, i.e., 'j' and 's'.

- (e) (10 pts) Suppose occasionally the system will post some announcement messages, but unfortunately the system is not a user (thus it does not appear in the Users table). How can you allow these messages being posted while not adding a “system user” and not violating the foreign key constraint?
- (f) (10 pts) One desirable advanced feature of the BBS system is that each user not only can post message to the public, but also can send a message to a specific set of other users that are explicitly specified by userid when posting the message. How would you change the definitions of the above two tables so that this new feature can be implemented? You can introduce other tables if necessary.