Name: CS 487 Midterm

State all assumptions necessary to answer the questions. June 29, 2005

Student

SID: int	zipcode: int	email : text	name : text

Exam

EID: int	Place : text	Course : int	Date : text

Course

Course: int	Instructor : int	Dept : text	Semester : int

Grade

SID: int	Eid : int	Grade : int

$\{$ s.id $|Student(s) \wedge ((\exists r)Student(r) \wedge ((\exists q)Grade(q) \wedge r.sid = q.sid \wedge r.zip = s.zip \wedge ((\forall t)notGrade(t) \vee t.grade \leq q.grade))) \}$

What does the above query do?

Write the same query in SQL.

Could you use the division operator to achieve the same result in relational algebra? Explain.

What affect does the three schema architecture have on maintainability and portability for programs that access a database? How would each level be used in a program that was accessing the database?

In relational algebra can you write the natural join operator using $\sigma, \pi, \bigcup, and \bigcap$? If so, show an example, otherwise explain why not.

In the EER model is it allowed for different subclasses to overlap? If so show how this is represented, otherwise describe why it is not allowed.

Draw an ER diagram of the tables given, and include a Place entity as it relates to the Exam entity. Clearly identify the cardinality of the relationships, attributes, keys, and any other pertinent information.

Write a relational algebra query to report the sid, email, and grade for the midterm test in cs487 for the summer 2005 semester.

For each attribute on the student table explain under what circumstances it would make a good candidate key.

Include any changes to the table that would make either operation easier.
a) What actions should be taken to preserve referential integrity constraints when a delete operation is performed on a Course tuple.
b) What would need to be done to update the semester that the Course was offered?

Draw two examples of when an entity would have total participation in a relationship in the EER model.