

CS392 Database System Concept

Assignment 2

Due Mar. 10th, 2014

1. (10') List two reasons why null values might be introduced into the database.
2. (10') List the seven parts of SQL Language.
3. (20') Let $R = (A, B, C)$, and let r_1 and r_2 both be relations on schema R . Give an expression in SQL that is equivalent to each of the following queries:
 - a. $r_1 \cup r_2$
 - b. $r_1 \cap r_2$
 - c. $r_1 - r_2$
 - d. $\Pi_{AB}(r_1) \bowtie \Pi_{BC}(r_2)$

4. (20') Consider the SQL query

select $p.al$
from $p, r1, r2$
where $p.al = r1.al$ or $p.al = r2.al$

Under what conditions does the preceding query select values of $p.al$ that are either in $r1$ or in $r2$? Examine carefully the cases where one of $r1$ or $r2$ may be empty.

5. (20') Consider the following relational schema

employee(empno, name, office, age)
books(isbn, title, authors, publisher)
loan(empno, isbn, date)

Write the following queries in SQL.

- a. Print the names of employees who have borrowed any book published by McGraw-Hill.
 - b. Print the names of employees who have borrowed all books published by McGraw-Hill.
 - c. For each publisher, print the names of employees who have borrowed more than five books of that publisher.
6. (20') Consider the relational schema

student (student_id, student_name)
registered (student_id, course_id)

Write an SQL query to list the student-id and name of each student along with the total number of courses that the student is registered for. Students who are not registered for any course must also be listed, with the number of registered courses shown as 0.