

**Today:** Extended algebra; Datalog. §§ 5.\*

**Next class:** revisiting Codd's paper; catch-up; review.

**Reminders:** Midterm Exam on 16th. Read material *before and after* class. Use newsgroup.

1. List the members of your group below. Underline your name.
  
2. Consider a database with relations `Students(id, name, year)`, `Courses(id, title, ta)`, and `Enrolls(student, course, credits)`. A tuple  $(i, n, y) \in \text{Students}$  denotes a student with student-identifier  $i$ , name  $n$ , and year  $y$ . A tuple  $(i, t, a) \in \text{Courses}$  denotes a course with course-identifier  $i$ , title  $t$ , and whose teaching assistant's student-identifier is  $a$ . A tuple  $(s, c, r) \in \text{Enrolls}$  denotes the enrollment of the student with identifier  $s$  in the class with identifier  $c$ , for  $r$  credits.

We say student  $t$  is a TA of student  $s$ , for  $r$  credits, if  $s$  is enrolled for  $r$  credits in a course whose TA is  $t$ . We say a TA  $t$  is responsible for  $r$  credits if  $r$  is the sum of credits of all student enrollments in all courses whose TA is  $t$ .

Write a SQL statement to create a view that provides the names and IDs of the TAs who are the TAs of the maximum number of students for  $r$  credits, for each distinct value of  $r$  occurring in the database.

3. Write an extended algebra query that is equivalent to the query of Question 2.

4. Prove or disprove: Bag intersection may be expressed using bag union and difference.

5. Provide formal definitions of each of the bag algebra operators: selection, projection, cross product, union, difference.

6. Provide expressions for the minimum and maximum cardinalities of the result of each of the operators of Question 5 as a function of the cardinalities of its operands. Justify your answers.