

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 $(i, n, y) \in \mathbf{Students}$ denotes a student with student-identifier i , name n , and year y . A tuple $(i, t, a) \in \mathbf{Courses}$ denotes a course with course-identifier i , title t , and whose teaching assistant's student-identifier is a . A tuple $(s, c, r) \in \mathbf{Enrolls}$ 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 an extended algebra query for 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. It may be useful to use the linear notation for algebra.

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

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

5. Provide expressions for the minimum and maximum cardinalities of the result of each of the operators of Question 4 as a function of the cardinalities of its operands. Justify your answers.